Macroeconomic impacts of capital flows in emerging market and developing economies

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A thesis
submitted in partial fulfilment
of the requirements for the Degree of
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at
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by
Kongchheng Poch

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To my beloved father Ngornheng Ngov, mother Sengheap Khorn, my wife Solinin Top and my son Kongmathyea Poch for their love and care.

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Cross-border capital flows are one pillar of the evolving economic globalisation that governs today's world economy. Because of several waves of capital account liberalisation across developed and developing countries starting in the mid-1970s, cross-border capital flows have become a new norm. According to data from the IMF Balance of Payments database, gross capital inflows into emerging market and developing economies (EMDEs) rose steadily from an average of 4.9% of GDP in the 1990s to around 9.6% of GDP in the last decade. Dramatic surges in and variations of cross-border financial flows have extensive ramifications for the capital-receiving countries and their policy responses. This leads to debates on how the benefits of capital flows can be maximised and the costs minimised for EMDEs.

This study examines the impacts of capital flows on economic growth, domestic credit growth and real exchange rate in EMDEs. The study uses gross capital inflows and their different components (i.e., foreign direct investment (FDI), portfolio equity, portfolio debt and other investment) to assess their impacts on three macro-financial variables. The study sample of 130 EMDEs comprises 31 emerging market economies and 99 low-income developing economies between 1991 and 2015, incorporating all the world's regions; thus making it a most comprehensive study. The study employs a dynamic panel data approach to model the impacts of capital inflows on economic growth, domestic credit growth, and the real exchange rate. The models are estimated by the two-step system generalised method of moments.

This study documents multiple important findings. First, capital inflows are significantly strongly associated with economic growth. This strongly supports the economic view that foreign capital plays a vital direct role in driving economic growth in the capital-recipient economy. Second, there is substantial evidence that capital inflows are a driver of domestic credit growth. Third, capital inflows have a positive relationship with the real exchange rate. Fourth, capital inflow composition matters. Among the different forms of capital inflow, only FDI exerts an effect on the three macro-financial variables. FDI inflows promote economic growth, increase domestic credit growth and appreciate the real exchange rate. Fifth, financial development helps dampen the real appreciation effects of capital inflows but it does not have any mediating effect on the capital inflow-economic growth and capital inflow-domestic credit growth nexuses. However, the empirical evidence shows that financial development is conducive to economic growth and helps lessen the pace of domestic credit growth. Finally, institutional quality plays a vital role in enlarging the growth-enhancing effects and reducing the domestic credit growth-inducing effects driven by capital inflows.

Keywords: Capital inflows, economic growth, domestic credit growth, real exchange rate, dynamic panel data analysis

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Acronyms and Abbreviations

2SLS	Two-stage least squares
AEs	Advanced economies
BOP	Balance of payments
CIF	Capital inflows
DCG	Domestic credit growth
DEs	Developing economies
DWH	Durbin-Wu-Hausman test
EG	Economic growth
EMDEs	Emerging market and developing economies
EMEs	Emerging market economies
EU	European Union
FDI	Foreign direct investment
FE	Fixed effect
GDP	Gross domestic products
GFC	Global financial crisis
IFS	International Financial Statistics (database)
IMF	International Monetary Fund
IRR	Ilzetzki, Reinhart, and Rogoff (database)
MW	Modified Wald test
OECD	Organization for Economic Cooperation and Development
OI	Other investment
OLS	Ordinary least squares
PFD	Portfolio debt
PFE	Portfolio equity
RER	Real exchange rate
SGMM	System generalised method of moments
UNCTAD	United Nations Conference on Trade and Development
VAR	Vector autoregression
WDI	World Development Indicators
WEO	World Economic Outlook
WGI	World Governance Index

Chapter 1

Introduction

"Still, more work is needed to strengthen emerging and developing economies' influence over issues that directly affect them. One crucial issue is capital flows…"

Erik Berglöf (2018), Former Chief Economist

European Bank for Reconstruction and Development

1.1 Research Background

International capital flows are at the centre of rising financial and economic globalisation that has characterised today's world economy. Over the recent decades, cross-border capital flows have made relentless developments because of several waves of capital account liberalisation across the world. Capital account liberalisation that began with the US in the mid-1970s was soon followed by other developed countries and spread to developing countries in the 1990s and 2000s (Ocampo, 2017). Many countries have further liberalised their capital accounts in anticipation of the benefits of capital flows. Several international organisations have instituted rules and codes regarding cross-border capital flows (IMF, 2012). For instance, the Organization for Economic Cooperation and Development (OECD) has established the "Code of Liberalization of Capital Movements" that obliges high-level capital account openness among its member countries. Similarly, free capital mobility is a binding obligation among the European Union (EU) members and between the EU members and third countries. Consequently, rising cross-border capital flows have become the new orthodoxy.

Cross-border capital flows have recently grown steadily. According to Lund et al. (2017), gross capital inflows at the global level expanded from around US$1 trillion in 1990 to about US$12.4 trillion in 2007 before the global financial crisis (GFC) took the world by surprise. Although gross capital inflows declined drastically after the GFC, they rebounded and reached US$4.3 trillion in 2016. Based on the same data (Lund et al., 2017), gross capital inflows as a percentage of the world gross domestic product increased from an average of 5.3% in 1990-2000 to an average of 11.5% in 2000-2010. They have maintained an average of 7.1% between 2010 and 2016.

Capital flows have not only been observed among developed or advanced economies (AEs) but also between AEs and emerging market and developing economies (EMDEs) and among EMDEs. Since the 1990s, cross-border capital flows have dramatically expanded because more developing countries have opened up their economies and connected to international financial markets. Cross-border capital flows into developing countries, consisting of emerging market economies (EMEs) and low-income developing economies (DEs), have drastically expanded from an average of around US$90 billion in the 1990s to approximately US$254 billion in 2011-2015.

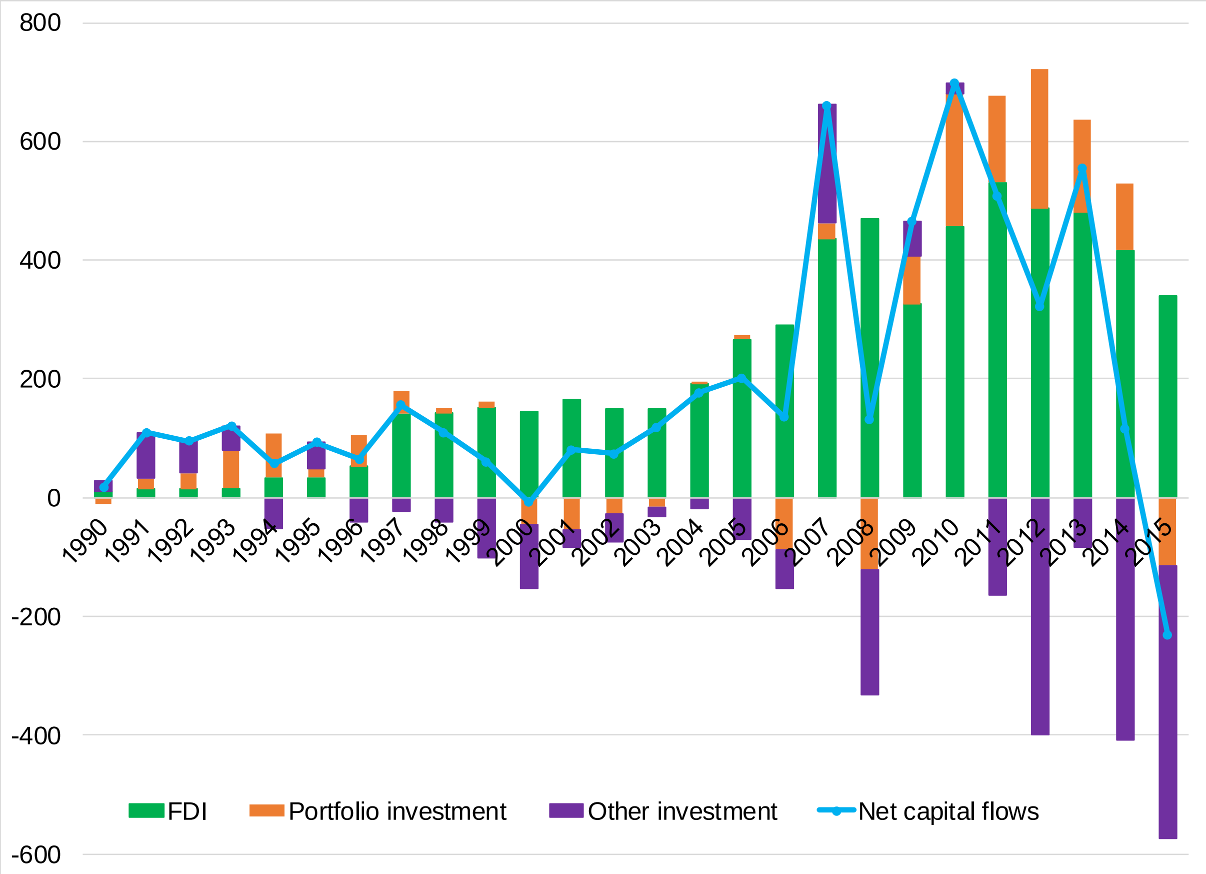
Cross-border capital flows into EMDEs have markedly evolved in the past few decades in terms of both magnitude and structure according to the International Monetary Fund (IMF)'s World Economic Outlook Database October 2018. Figure 1.1 shows net private capital flows into EMDEs grew over six times from an average of US$90 billion in the 1990s to about US$660 billion in 2007 before the GFC choked the world economy. However, they rose again to about US$700 billion in 2010. This might be caused by the implementation of quantitative easing policies, that is, the injection of money into the economy through bond-purchasing programmes by many advanced economies (e.g., the US, the European Union and Japan). Recent studies show that capital flows into EMDEs after the 2008-2009 GFC had been pushed by global risk aversion (Hannan, 2017). Then, the net capital flows into EMDEs hovered around US$376 billion in the period 2011-2014 before drastically declining to negative US$232 billion in 2015, which could possibly be due to the interest rate hikes in the US. As argued by the IMF (2016), the retrenchment in capital flows in the last several years was largely because of the low growth prospects in EMDEs and, lately, tightening of US monetary policy.

During 1990-2015, the composition of net capital flows into EMDEs changed markedly. Foreign direct investment (FDI) has played a critical role in supplying financial resources to the developing world, accounting for the largest share of the net capital flows into EMDEs. Although FDI continues to play a predominant role, portfolio investment and other investment (i.e., bank lending, trade credit and other investments) have increasingly expanded their shares recently. Hence, it is extremely important to have a better understanding of the dynamics of capital flows and their ramifications for EMDEs.

In the last 25 years, cross-border capital flows into EMDEs experienced dramatic variations and exhibited noticeable cycles (IMF, 2016). Figure 1.1 shows several boom-and-bust cycles of net capital flows into EMDEs. Such considerable surges in and variations of cross-border financial flows have far-reaching consequences for the capital-receiving countries and their policy responses. Capital flow fluctuations are generally considered an alarming issue for macroeconomic and financial stability in EMDEs (Pagliari & Hannan, 2017). This leads to debates on how the benefits of capital flows can be maximised and the costs minimised for EMDEs.

The expansion of cross-border capital flows started in the 1970s was driven by two main forces. The first underlying force was investors searching for higher returns and risk diversification across borders. The second important force was that many countries had relaxed restrictions on cross-border financial flows, deregulated domestic financial markets, liberalised investment regimes and market-oriented economic reforms (Agénor & Montiel, 2008).

Figure 1.1 Net capital flows into emerging market and developing economies (US$ Billions)



Source: Author's calculations based on data from the IMF's WEO database, October 2018.

Based on the seminal work by Calvo, Leiderman, and Reinhart (1996), the drivers of international capital flows can be better understood under the framework of "push and pull" factors (Agénor, 1998; Chuhan, Claessens, & Mamingi, 1998; Fernandez-Arias, 1996; Forbes & Warnock, 2012; Fratzscher, 2012; Sarno, Tsiakas, & Ulloa, 2016; Taylor & Sarno, 1997). Push factors are outside forces that attract capital to a country. For instance, the factors driving capital from the US to EMDEs include low economic growth and interest rates in the US. Conversely, pull factors are country-specific features that attract capital. These features comprise high domestic interest rates, high economic growth prospects, ample investment profitability, trade and financial openness. In short, push factors are outside the capital-recipient economy whereas pull factors are inside features (Calvo et al., 1996; Sarno et al., 2016).

Cross-border capital flows have enormous hegemony in the economy. Their fundamental links to the economic and financial conditions of countries can result in benefits and costs to the capital-recipient countries and have extensive implications for macroeconomic policy management (Koepke, 2019). For capital-constrained countries, capital flows play a vitally important role in promoting economic development. Developing countries, which often face more restrictive capital constraints than developed countries, generally seek foreign capital to relieve local capital shortages, finance productive investments and stimulate economic production and growth (Dornbusch, 1998; Fischer, 1998). With the spectacular increase in international capital flows to EMDEs since the 1990s, it has been observed that capital flows, particularly private capital flows, exhibit a mounting influence (Combes, Kinda, & Plane, 2012).

International capital flows can theoretically bring substantial potential benefits such as consumption smoothing, a positive impact on domestic investment and economic growth, improved macroeconomic discipline, and increased financial system stability and efficiency (Agénor & Montiel, 2008; Ocampo, 2017). In the words of the former IMF Deputy Managing Director, Stanley Fischer (1998), "free capital movements facilitate an efficient allocation of savings and help channel resources into their most productive uses, thus increasing economic growth and welfare." Through access to international capital, the capital-recipient economies can tap into the diverse financial resources needed to finance consumption and investment, thereby improving economic stability (Ocampo, 2017).

However, there are costs associated with capital flows. According to Agénor and Montiel (2008), they are a high degree of capital flow concentration and lack of financial access, especially for small economies; misallocation of capital flows in the capital-receiving countries; loss of macroeconomic stability, procyclical movements in short-term capital flows; herding, contagion and volatility effects of capital flows; and risks related to the entry of foreign banks. The rapid development of international capital flows is potentially a critical threat to financial and economic stability (Obstfeld, 2012). Based on historical evidence as highlighted by Obstfeld (2012), international capital flows are the main catalyst for inducing and intensifying economic and financial crises. The negative consequences of capital flows stem from their characteristics and behaviour. The volume, variation, cyclicality and the reversal of or sudden stops in capital flows may cause exchange rate swings and thus macroeconomic and financial instability. According to Combes et al. (2012), a surge in capital inflows may increase financial system vulnerability and overheat the economy. The influx of capital inflows may result in excessive credit provision to risky projects that amplify credit boom and bust cycles (Blundell-Wignall & Roulet, 2014; Rodrik, 1998). In this regard, cross-border capital flows present formidable challenges for macroeconomic management and policy.

As the EMDEs are increasingly integrated into the world economy and global financial system, they are exposed to changes in capital flow movements. However, cross-border capital flows can generate both positive and negative impacts on capital-recipient economies. With the promise of enhanced economic growth and living standards, capital flows also carry substantial risks that are grave concerns for EMDEs' policymakers, requiring appropriate policy responses. Therefore, since capital flows have enormous influence on the economic health of EMDEs, it is necessary to examine the virtues and costs associated with capital flows.

1.2 Problem Statement

Capital flows continue to be a critical policy issue for policymakers and practitioners around the world, especially for EMDEs' policymakers. As stated by the IMF Managing Director in November 2018, "capital flows" were on the list of the top five priority issues for the IMF policy and economic analysis work programme in the following year. The statement echoes earlier proclamations of the importance of undertaking research and analysis on recurring topics such as capital flows. International capital flows remain a debatable topic in international finance (Villafuerte & Yap, 2015) and international economic policy and research (Sarno et al., 2016). As such, capital flows are a critical issue that may not have the same answer or solution as 10 or 20 years ago given the varying, dynamic nature of capital flows and the changing shape of the world economy.

Many studies have explored the issue of capital flows from various perspectives. Many studies have theoretically or empirically examined the drivers or determinants of capital flows (Belke & Volz, 2018; Byrne & Fiess, 2016; Sarno et al., 2016; Tchorek, Brzozowski, & Śliwiński, 2017; Yang, Shi, Wang, & Jing, 2019). Other studies investigated reversals or sudden stops of capital flows (Calderón & Kubota, 2013; Cowan & Raddatz, 2013) and a few studies reviewed the literature or policy prescriptions related to capital flow management (BIS, 2009; Henry, 2007; Koepke, 2019; Milne, 2014; Ostry et al., 2010; Ostry et al., 2011). However, studies on the benefits and costs of capital flows continue to be an area of academic and policy debates because existing evidence lacks robustness and consensus (Agénor & Montiel, 2008; Kose, Prasad, & Taylor, 2011). The impacts of international capital flows remain an important policy question, especially for developing countries or EMDEs (Jahan & Wang, 2016).

Capital flows can theoretically promote economic growth and development in capital-recipient economies given that the capital flows are used to finance productive investments in tradable goods and services so that repayments are promised by future export surpluses (Blanchard & Giavazzi, 2002; Eichengreen, 2010; Lucas, 1990; Samarina & Bezemer, 2016). However, empirical evidence on the growth benefits of capital flows can be viewed at best as mixed (Eichengreen, Gullapalli, & Panizza, 2011; Gehringer, 2015; Gente, León-Ledesma, & Nourry, 2015; Kose, Prasad, Rogoff, & Wei, 2010; Prasad, Rajan, & Subramanian, 2007). Though some studies provide evidence of the growth-enhancing effects of capital flows (Choong, Baharumshah, Yusop, & Habibullah, 2010; Delgado, McCloud, & Kumbhakar, 2014; Eichengreen et al., 2011; Gehringer, 2015; Kunieda, Okada, & Shibata, 2014; Kyaw & Macdonald, 2009; Vithessonthi & Tongurai, 2012), other studies find no evidence (Kose et al., 2011; Prasad et al., 2007; Rodrik, 1998). These latter studies detect no evidence that capital flows directly propel economic growth (Kose et al., 2011; Prasad et al., 2007). A few studies conclude that countries relying on external capital have not achieved faster economic growth than those countries that do not (Gourinchas & Jeanne, 2013; Prasad et al., 2007). On the contrary, capital flows are the source of macroeconomic instability and crisis in developing countries. Thus, they are not beneficial for economic growth (Prasad, Rogoff, Wei, & Kose, 2003).

Meanwhile, the capital flow upsurge would be a source of overheating the economy and complicating macroeconomic policymaking in capital-receiving countries (Corden, 1994). An increase in capital flows may lead to a credit boom that could potentially fuel upward pressures on inflation and bubbles in asset prices (Grenville, 2008). It is frequently argued that rapid credit expansions or credit booms are strongly associated with financial crises (Gourinchas & Obstfeld, 2012; Schularick & Taylor, 2012). For instance, the recent economic crises in the peripheral European countries were largely related to credit booms (Lane & McQuade, 2014). However, because many studies concentrate on the macroeconomic impacts of credit growth or the relationship between credit growth and financial crisis, the role of capital flows as a major driver of credit growth has been relatively under-explored. More importantly, the anatomy of the capital flow-credit growth nexus in EMDEs is, to the best of our knowledge, unavailable in the literature.

Furthermore, an influx of capital may cause large current account deficits (Chang, 2014) and real exchange rate appreciation, which would reduce the competitiveness of the country's export industries (Calvo, Leiderman, & Reinhart, 1993; Combes et al., 2012; Lartey, 2008). However, the empirical evidence on the capital flows' real exchange rate effect is inconclusive. Several studies contend that international capital flows induce real exchange rate appreciation (Combes et al., 2012; Elbadawi & Soto, 1994; Jongwanich, 2010; Lartey, 2007) but other studies do not find any such evidence (Bakardzhieva, Naceur, & Kamar, 2010). More importantly, even for the same type of capital flows (e.g., non-FDI inflows), prior studies (Combes et al., 2012; Elbadawi & Soto, 1994) provide contradictory results and conclusions.

The diverging empirical results may be attributable to different samples, study periods, data frequencies, modelling and estimation methods, and/or variable measurements. Some studies use a small sample from which it is hardly possible to generalise the empirical results. The merits of capital account liberalisation remain mixed (Friedrich, Schnabel, & Zettelmeyer, 2013). The evidence that financial liberalisation contributes to economic growth in developing countries is far from being a consensus (Friedrich et al., 2013).

Although the debate on the benefits and costs of capital flows for EMEs has been undertaken significantly, a study focusing on developing countries or EMDEs that include both EMEs and DEs is unexplored. As the pace of financialisation across the world is staggering, EMDEs stand to obtain an influx of capital and excess liquidity. However, EMDEs are particularly vulnerable to changes in capital flows (Koepke, 2019; Obstfeld, 2012) because they have distinctive characteristics compared with advanced economies (Kose et al., 2010). Crises resulting from unfavourable movements of capital flows can have devastating impacts on EMDEs. Therefore, the impacts of capital flows on EMDEs warrant attentive empirical examination.

Discussion of the merits and demerits of capital account liberalisation is not going to go away, given the changing global political and economic landscape (Klein & Olivei, 2008). Based on the World Economic Outlook Report October 2018, EMDEs comprise 155 economies, contributing 59% of the world's gross domestic product (GDP) (IMF, 2018). If anything happens to EMDEs, global economic progress would be derailed. Moreover, capital flow developments have markedly changed over recent decades in terms of volume and pattern. Given the rising importance and influence of EMDEs in the international economic and financial landscape, whether capital flows are beneficial or harmful for EMDEs remains not only relevant but are a contemporary, critical policy question. Further, capital account openness would possibly not generate the same merits for all countries (Klein & Olivei, 2008).

Where many studies evaluated the impact of capital flows at aggregate levels, this study aims to provide a granular analysis for different forms of capital flows: FDI, portfolio equity (PFE), portfolio debt (PFD) and other investment (OI). As international capital flows may affect economic growth differently given the diverse types of capital flows, it is worthwhile evaluating the impacts of equity and debt flows separately (Bonfiglioli, 2008). The composition of capital flows may drive different empirical results on the impacts of capital flows.

There is a critical need for robust empirical evidence on the impacts of capital flows on EMDEs to provide inputs for appropriate policy design and action. Policymaking should be based on sound, rigorous evidence (van Hilten, 2018). Therefore, with the focus on EMDEs, this study attempts to disclose new empirical evidence by using a comprehensive sample of 130 EMDEs encompassing all the world's regions and a longer study period with dynamic panel data models to address endogeneity issues.

1.3 Research Objectives

As discussed in section 1.2, the merits and demerits of capital flows continue to be critical in academic and policy debates, especially for policymakers in EMDEs. Against this backdrop, this study aims to empirically investigate the impacts of capital flows on macroeconomic and financial variables in EMDEs between 1991 and 2015. The specific objectives are to:

1) investigate the impacts of capital flows on economic growth in EMDEs;
2) investigate the impacts of capital flows on domestic credit growth in EMDEs;
3) investigate the impacts of capital flows on the real exchange rate in EMDEs;

4) investigate the role of domestic economic conditions, focusing on financial sector development, in dealing with the impacts of capital flows; and
5) derive the policy implications of the impacts of capital flows on EMDEs.

1.4 Research Questions

With reference to the above research objectives, the research questions are:

1) Do capital flows contribute to economic growth in EMDEs?
2) Do capital flows induce credit growth in EMDEs?
3) Do capital flows induce real exchange rate appreciation in EMDEs?
4) Do the impacts of capital flows on economic growth, credit growth and the real exchange rate in EMDEs depend on domestic economic conditions, particularly financial sector development?
5) What are the policy implications of the impacts of capital flows on EMDEs?

1.5 Contributions of the Research

Economic and financial crises can spill across borders through financial linkages (Kose et al., 2011). The 2008-09 GFC is one example of how a financial crisis in one economy can spread to many other economies across the world. The subprime mortgage crisis originated in the US in late 2007 and was transmitted into a devastating global financial crisis via cross-border financial transactions. As such, cross-border capital flows can bring about both positive and negative impacts for capital-receiving countries. By engaging in capital account openness, EMDEs are in a precarious position of gaining benefits from or paying costly prices for capital flows.

This study makes a number of contributions to both knowledge and policy. On the knowledge front, this study is instrumental for six reasons. First, this study helps fill a literature gap. The study provides new evidence in the currently unresolved debate on the merits and demerits of capital flows, whether capital flows are conducive to economic growth and whether capital flows induce domestic credit growth and real exchange rate appreciation. Through the new evidence, this study provides insights to a better understanding of the positive and negative consequences of capital flows on capital-recipient economies.

Second, the research on capital flows in developing countries or EMDEs is scarce. The focus of this study is on these economies that are susceptible to changes in global economic conditions and particularly capital flow movements. Third, this study covers a longer sample period (i.e., 1991-2015) that improves the quality of the data and thus the results. It is worth noting that many developing economies experienced transition periods in the 1990s, which could affect the quality of the data. The study also captures the GFC from late 2007 to 2009 in which the devastating crisis was transmitted from industrialised economies to developing economies. Consequently, the changes in the global economic conditions are reflected in the study period. Fourth, this study fills another important literature gap that is the impacts of capital flow composition. This study improves the results of previous research by exploring the impacts of capital flow at both aggregated and disaggregated levels. Specifically, this study provides a more granular quantitative analysis by decomposing aggregated capital flows into FDI and non-FDI and, at the most granular level, as FDI, PFE, PFD and OI. Overall, this study helps improve generalisation of the results of the impacts of capital flows on EMDEs because of the large EMDE sample, long study period and detailed empirical analysis of capital flow composition.

Fifth, this study helps enhance our understanding of the impacts of capital flows by examining the roles of domestic economic conditions of the capital-recipient economies, particularly the financial sector development and institutional quality, which are marginally considered in the literature in dealing with capital flows. Through the lens of the interactions between capital flows and domestic economic conditions, this study helps contribute to the debate whether the impacts of capital flows are conditional on domestic economic conditions of the capital-recipient economies. In this respect, this study argues that financial sector and institutional development play crucial roles in promoting the growth-enhancing effects of capital flows while minimising such negative impacts of capital flows as real exchange rate appreciation and rapid credit expansion that can erode competitiveness and cause macroeconomic overheating and financial instability, respectively. Sixth, this study also adds innovation to the literature by using the two-step approach in constructing the interaction terms between capital inflows and domestic economic condition variables including financial development, institutional quality, exchange rate regime and excess money supply. This study provides clarity to the lens used to examine the interactions between capital inflows and domestic economic conditions in EMDEs.

On the policy front, this study makes two important contributions. First, this study informs policymakers and practitioners about the developments and dynamics of capital flows in EMDEs as well as their impacts on key macro-financial variables such as economic growth, domestic credit growth and real exchange rate. As this study shows that capital flows are conducive to economic growth, it is essential for EMDE policymakers in formulating and implementing a viable strategy to attract capital flows to increase economic activity and investments, resulting in sustained economic growth and improved welfare. This study also presents the negative impacts of capital flows: domestic credit growth acceleration and real exchange rate appreciation. To some extent, the increase in domestic credit growth is beneficial for economic growth and tolerable to maintain macroeconomic stability. However, rapid credit expansion caused by capital inflows is the driver of financial and macroeconomic instability, which, in turn, is not conducive to economic progress. Likewise, the real exchange rate appreciation can wear down the competitiveness of the export industries in EMDEs, which would cause deterioration in the current account, local economic production, national income and thus economic prosperity. In that regard, this study's findings provide concrete, relevant evidence for EMDE policymakers in making informed, adequate policy, strategies and action plans to not only maximise the benefits but also handle the risks accompanying capital flows. Second, this study provides specific policy advice to EMDE policymakers and practitioners in addressing the trade-off between the benefits and costs associated with capital flows. This study suggests EMDE policymakers increase efforts in promoting financial sector and institutional development that can play a fundamental role in deriving the economic growth benefits of capital flows as well as reducing the adverse impacts such as rapid credit growth and real exchange rate appreciation. Generally, this study provides evidence-based policy advice, which is a prerequisite for making informed policy decisions and practices to promote sustainable, inclusive economic development in EMDEs.

1.6 Structure of the Thesis

This thesis is composed of seven chapters. Chapter 1 provides a context of the research, an overview of the research problem, and a set of research questions to be addressed. Chapter 2 reviews previous studies in the literature to identify research gaps, indicate the motivations of this study and develop a conceptual and empirical framework to address the research questions. Next, Chapter 3 outlines the research methodology, specifically the empirical models, estimation methods and variable measurements. Chapter 4 discusses the empirical results and findings on the capital flows-economic growth relationship. Chapters 5 and 6 discuss the capital flows-domestic credit growth and capital flows-real exchange rate relationships, respectively. Chapter 7 provides the conclusions, policy implications and possible directions for future research.

Chapter 2

Literature Review

"… the need to better appreciate dynamics in cross border flows of capital and goods has never been greater in order to better understand developments in one's own economy."

Simon Potter (2017), Executive Vice President, Federal Reserve Bank of New York

2.1 Introduction

This chapter critically reviews previous studies related to the relationships between capital flows and economic growth, domestic credit growth, and real exchange rate. Section 2.2 defines capital flows and their associated terms. Section 2.3 gives an overview of the literature on capital flows. Section 2.4 presents a theoretical framework and prior empirical studies on the capital flows-economic growth nexus. Section 2.5 presents the theoretical framework and prior empirical work on the linkage between capital flows and domestic credit growth. Section 2.6 discusses the conceptual framework and previous empirical research related to the capital flows-real exchange rate nexus.

2.2 Definition of Capital Flows

According to the IMF's Balance of Payments and International Investment Position Manual, "capital flows" are transboundary financial flows that are logged in the financial account of a country or an economic territory (Bluedorn, Duttagupta, Guajardo, & Topalova, 2013). "Capital inflows" denote the possession of domestic assets by non-residents whereas "capital outflows" are the overseas assets acquired by domestic residents (IMF, 2016). Hence, the aggregation of capital inflows and outflows is defined as "gross capital flows." The disparity between capital inflows and outflows is the "net capital flows" (IMF, 2016). It is worthwhile noting that capital inflows can be considered the mirror image of the current account in an economy's balance of payments.

Capital flows can be, according to the IMF's world economic outlook database, distinguished as official flows and private flows. Official capital flows include foreign transfers, development aid, official development assistance and sovereign loans. Private capital flows, which are the principal focus of this study, are FDI, PFE, PFD and OI whose major component is bank lending or bank flows (Araujo, David, Van Hombeeck, & Papageorgiou, 2015; Bluedorn et al., 2013).

The literature interchangeably uses several terms such as financial integration, financial liberalisation, financial openness, capital account openness, capital account liberalisation, and capital flows. Generally, financial openness is based on two measures: de jure and de facto measures. De jure measures are defined as regulatory restrictions on cross-border financial transactions; de facto measures are the actual quantity of financial transactions across the border, which are specifically called “capital flows” (Kose et al., 2011). Strictly, the first five terms generally refer to the rules and regulations related to the financial accounts of the economy’s balance of payments whereas capital flows are the actual values of cross-border financial transactions. Some studies (Gehringer, 2013; Okada, 2013; Trabelsi & Cherif, 2017) use de jure measures to proxy for financial liberalisation or capital account openness whereas other studies (Ahmed, 2011; Beckmann & Czudaj, 2017; Kyaw & Macdonald, 2009) use the actual amount of cross-border capital flows.

It can be argued that since the implementation of restrictions on cross-border financial flows varies dramatically across countries, de jure measures are unable to adequately reflect the impacts of financial liberalisation on macroeconomic and financial variables. As emphasised by Kose et al. (2011), the most important matter in analysing the impacts of financial openness is to what extent countries are truly integrated into the global financial markets. Hence, this study considers the de facto measure of financial liberalisation, which is the capital inflows to assess the impacts on macroeconomic and financial variables in EMDEs.

2.3 Overview of the Literature

Capital flows are a central interest among academic and policy circles because the debate is less than a consensus and capital flows continue to pose policy challenges, especially for EMDEs. As evidenced in the literature, international capital flows play a critical role in countries’ economic and financial systems. A surge in capital flow significantly affects macroeconomic and financial variables such as economic growth, domestic consumption and spending, exchange rates, inflation rates, and asset prices. Noticeably, the debate on capital flows has been markedly revived since the 2008-2009 GFC (Koepke, 2019; Kose et al., 2011) and the prolonged economic recession in the European Union.

The capital flow literature can be classified into three major categories: causes or drivers, consequences, and policy responses or management. Several studies substantially survey the literature on the capital flow drivers (Koepke, 2019), impacts (Henry, 2007; Prasad et al., 2003) and policy responses (BIS, 2009; Dooley, 1995; Milne, 2014; Ostry et al., 2011). This chapter reviews the extant studies related to the principal focus of the study, the macro-financial impacts of capital flows on the capital-recipient economies including economic growth, domestic credit growth and real exchange rate.

This study is interrelated with several literature strands. First, since this study investigates the economic growth effects of capital inflows, it is directly related to the determinants of economic growth. The study also relates to a rising strand of finance and growth literature. Second, it is also concerned with the determinants of domestic credit growth or credit boom, which are generally viewed as related to banking and financial crises. Third, it contributes to the literature on the drivers of real exchange rate movements because this study empirically investigates whether capital inflows induce appreciation of the real exchange rate in EMDEs.

2.4 Capital Flows–Economic Growth Nexus

This section presents a theoretical framework and a review of empirical literature related to the capital flows-economic growth nexus. The section begins with a discussion of the possible theoretical relationship between the two variables, followed by a review of the empirical evidence and conclusion.

2.4.1 Theoretical perspective

Financial globalisation results in growing cross-border capital flows from capital-rich countries to capital-scarce countries (Gehringer, 2013; Kose et al., 2010) because the return on the capital is higher in the latter. Based on the standard neoclassical growth model, capital flows positively generate direct impacts on economic growth in the capital-recipient economies by addressing financial constraints or financing development needs. The increased capital flows cause a reduction in capital cost that results in increased economic activity and thereby enhanced economic growth (Barro, Mankiw, & Sala-i-Martin, 1995; Gehringer, 2013; Gourinchas & Jeanne, 2006). More importantly, capital flows are generally viewed as beneficial for economic growth in developing nations, where capital is relatively scarce. Developing nations' ability to access international financial resources helps promote economic growth (Agénor & Montiel, 2008). Many developing countries are capital scarce but labour abundant, so they theoretically stand to benefit more from international capital flows (Kose et al., 2011).

Based on the neoclassical growth model, capital flows play an essential role in bridging the saving-investment gap in the capital-recipient countries, causing an increase in investment and economic efficiency and thereby higher economic growth (Kyaw & Macdonald, 2009). The (net) foreign capital flows can help a country augment domestic savings and promote capital accumulation that may deliver higher economic growth (Bosworth, Collins, & Reinhart, 1999). For many developing countries, savings are generally low, which is not adequate for investment in their economic development. Their saving capacity is limited by the low income level (Agénor & Montiel, 2008). The net capital flows not only complement domestic savings but also augment the per capita physical capital that is a fundamental input for improved economic growth in developing countries (Agénor & Montiel, 2008).

Capital flows are, moreover, a key catalyst in improving productivity (i.e., total factor productivity and labour productivity), which is vital in raising the economic growth rate (Gehringer, 2015). Capital flows can promote technological development through either new technology transfer or knowledge augmentation. According to Mankiw (2010), economic growth is a function of technological advancement in addition to capital and labour. Apart from enhancing the per capita physical capital, capital flows can diffuse ideas and innovation from advanced to developing countries (Kyaw & Macdonald, 2009; Romer, 1993). As highlighted by Kyaw and Macdonald (2009), recent growth models have explicitly included human capital in the production functions in the analysis of economic growth and allowed for knowledge externalities.

Besides the direct benefits, capital flows also generate indirect economic growth benefits in the capital-recipient economies (Kose, Prasad, Rogoff, & Wei, 2009; Kose et al., 2010; Kose, Prasad, & Terrones, 2009). Capital flows' indirect impacts on economic growth work through the enhancement of domestic social and economic conditions that are conducive to economic growth. Specifically, capital flows help promote domestic financial development, corporate governance enhancement, institutional development (e.g., public governance and regulatory regime), and disciplined macroeconomic policies (Kose et al., 2010; Kose, Prasad, & Terrones, 2009) that can, in turn, drive economic growth. The impacts of financial liberalisation on economic growth have been significantly debated in the literature (Levine, 2005; Mishkin, 2006, 2009). Capital flows help reduce some agency problems and thereby create incentives for firms to improve their corporate governance (Stulz, 2005). As argued in the literature (Acemoglu & Robinson, 2012; Rodrik, Subramanian, & Trebbi, 2004), improved institutional quality is associated with increased economic growth rates. This suggests that the indirect or "collateral" benefits of capital flows are more important than the direct benefits (Kose et al., 2011).

2.4.2 Empirical evidence

Many studies have tried to establish a link between capital account openness or capital flows and economic growth, but the empirical evidence is far removed from being a consensus. Numerous studies document the positive effects of capital flows on economic growth (Delgado et al., 2014; Gehringer, 2013, 2015; Kunieda et al., 2014; Kyaw & Macdonald, 2009; Quinn & Toyoda, 2008; Vithessonthi & Tongurai, 2012). In contrast, some studies find opposing evidence (Ahmed, 2013, 2016; Camarero, Peiró-Palomino, & Tamarit, 2017; Carkovic & Levine, 2002). Yet, other studies are unable to provide any significant evidence of the capital account openness and economic growth linkage (Ahmed & Mmolainyane, 2014; Prasad et al., 2007; Prasad et al., 2003; Rodrik, 1998; Satyanath & Berger, 2007).

By applying "de jure" measures, a few studies document the positive impacts of financial openness on economic growth (Bekaert, Harvey, & Lundblad, 2011; Gehringer, 2013; Quinn & Toyoda, 2008). Gehringer (2013), who employed the system generalised method of moments (SGMM) to a sample of 26 EU countries from 1990-2007, reported that financial openness exerts positive impacts on economic growth as well as on economic growth sources including capital accumulation and productivity. Bekaert et al. (2011), who carried out a study for 96 countries over 1980-2006, also found that capital account liberalisation strongly affects economic growth. These authors argued further that the most significant merit of capital account openness is factor productivity growth, which is of greater significance than capital accumulation growth. However, these authors applied a fixed-effect method in estimating the model of financial openness and economic growth in a static econometric framework and failed to account for the dynamics of economic growth. Bekaert et al.'s (2011) and Gehringer's (2013) findings corroborate the empirical results of Quinn and Toyoda (2008), strongly suggesting that financial openness helps propel economic growth.

However, other studies, which also applied de jure measures, detected no proof of a linkage between financial openness and economic growth (Butkiewicz & Yanikkaya, 2008; Edison, Levine, Ricci, & Sløk, 2002; Prasad & Rajan, 2008; Prasad et al., 2007; Rodrik, 1998). Bussiere and Fratzscher (2008) showed no long-run relationship between capital account openness and economic growth. Because of capital account openness, there is essentially an intertemporal trade-off in economic growth, meaning that a country experiences a short-run growth benefit following the opening of the capital account to the detriment of medium- or long-run growth. Prasad et al. (2007) could not find any indication of a positive link between financial liberalisation and economic growth. By analysing a cluster of 57 economies, Edison et al. (2002) revealed that financial liberalisation does not exert any impact on economic growth. The result remained unchanged even after controlling for key factors such as financial, policy and institutional determinants. This finding further supports the early finding by Rodrik (1998) of no evidence that countries with less restrictive capital account regulations achieve faster economic growth, more investments or lower inflation. Rodrik and Subramanian (2009) concluded that worldwide financial liberalisation has not resulted in higher investments or economic growth in developing economies. In summary, the literature provides mixed evidence about the linkage between capital account openness and economic growth. Existing research uses de jure measures of financial liberalisation, which may not fully capture the extent to which a country is connected with international financial markets.

Another literature strand that examines the linkage between financial openness using de facto measures (i.e., the actual volume of cross-border capital flows) and economic growth is also mixed. On one side, numerous studies confirm a positive relationship between capital flows and economic growth (Beckmann & Czudaj, 2017; Gehringer, 2015; Ibrahim, Mazlina, Azman-Saini, & Zakaria, 2016; Kyaw & Macdonald, 2009). Conversely, other studies find conflicting results (Ahmed, 2013, 2016; Camarero et al., 2017; Eng & Wong, 2016; Gourinchas & Jeanne, 2013) and a number of empirical inquiries discover no significant indication of the capital flows-economic growth nexus (Gente et al., 2015; Hye & Wizarat, 2013; Mmolainyane & Ahmed, 2015).

By employing the Bayesian time-varying panel vector autoregression (VAR) approach to a sample of 24 EMEs from 1988Q1-2013Q4, Beckmann and Czudaj (2017) reported on the growth-enhancing benefits of capital flows. The growth-enhancing effects of financial openness were confirmed by Butkiewicz and Yanikkaya (2008), who applied the de facto measure of capital account openness for 114 advanced and developing countries between 1970 and 1997. Economies tend to grow faster in countries where the inflows of FDI and portfolio investments were higher (Butkiewicz & Yanikkaya, 2008). Iamsiraroj (2016) revealed that FDI generates a positive impact on income growth, according to the results of a simultaneous system of equations analysis for 124 economies during 1971-2010. A parallel finding was unveiled by Ibrahim et al. (2016) who employed a quantile regression approach to a group of 73 economies between 1980 and 2013.

In contrast, some studies provide empirical support for negative growth impacts of capital flows. By employing non-parametric kernel regressions to a large sample of 103 nations from 1983-2011, Camarero et al. (2017) showed that countries with a positive net capital flow (capital-exporting countries) are likely to experience higher economic growth than the countries with a negative net capital flow (capital-importing countries). In other words, the capital-receiving countries tend to perform more poorly in terms of economic growth than capital-exporting countries. This finding is at odds with the intertemporal model, which is the main theoretical framework used extensively in the literature. Its projection is that capital-receiving economies should achieve faster economic growth than the capital-exporting economies. According to Eng and Wong (2016), who carried out asymmetric Granger causality tests on a sample of nine Asian countries, there is no evidence that capital inflows enhance long-term economic growth within constrained borrowing conditions whereas capital outflows are detrimental to economic growth. This finding is not a surprise. Gente et al. (2015), who conducted a theoretical analysis using an overlapping generation model of endogenous growth, showed that opening the capital account is detrimental to economic growth in constrained borrowing conditions and the result is reversed in unconstrained conditions. Based on regression analysis of 21 African nations, Ahmed (2013) found a negative linkage between capital flows and economic growth.

Multiple studies are unable to provide clear-cut evidence linking capital flows to economic growth. Gente et al. (2015), who analysed seven Latin American and Southern European countries, could not find any empirical support for the growth-enhancing impact of capital inflows. Similarly, Mmolainyane and Ahmed (2015) documented no evidence of a direct linkage between capital account liberalisation and GDP growth rate in Botswana. Hye and Wizarat (2013) found a similar result for Pakistan. These authors revealed that financial openness does not have any long-run effect on economic growth even though there is a short-run effect. Ahmed (2011) conducted regression analysis of 25 African nations and found weak evidence of the growth-enhancing effect of capital flows although the author argued that there might be an indirect effect because capital flows help deepen domestic financial markets.

Different types of capital flows, different impacts: Mixed results

Different forms of capital flows may generate different effects on economic growth. FDI is typically considered the most beneficial type of capital flows, especially for developing and emerging countries (Agénor & Montiel, 2008). FDI can generate both direct and indirect benefits. FDI arguably can benefit the capital-receiving countries through either the transfer of managerial and technological expertise or spillover and diffusion effects (Borensztein, De Gregorio, & Lee, 1998; Bosworth et al., 1999; Grossman & Helpman, 1991; Javorcik, 2004; Kyaw & Macdonald, 2009). For example, a factory with a well-organized production process and better managerial practices has higher production efficiency than a poorly organised one. The presumed benefits can lead to improved long-term productivity and thereby economic growth (Javorcik, 2004).

Borja (2017) showed that FDI is a crucial variable in explaining economic growth in capital-receiving countries in a growth regression analysis of 130 developing countries between 1985 and 2014. Delgado et al. (2014) also concluded that FDI positively contributes to economic growth. By applying semi-parametric regression analysis to a group of 60 non-OECD countries, the authors found that a one-tenth rise in net FDI inflows to GDP can induce increased economic growth rates in the range of 0.11% to 4.32%. Blanchard, Ostry, Ghosh, and Chamon (2015), who estimated a dynamic panel data model of a sample of 19 EMEs from 2000-2015, suggested that non-bond flows are conducive to output growth based on the condition that the policymakers of the capital-recipient economies intervene in the markets by employing combined policy tools. However, the authors treat FDI, portfolio equity flows and bank flows in the same group as equity flows or non-bond flows. Moreover, even though the endogeneity issues are addressed to some extent in the time-series dimension by employing two instrumental variables, Frankel (2016) pointed out that the study by Blanchard et al. (2015) suffers from endogeneity in terms of the cross-sectional dimension. According to Al Nasser's (2010) Granger causality tests, the causality between FDI and GDP growth rate was bi-directional for a panel of 14 Latin American countries. This implies that economic growth is a factor enticing FDI inflows, which would then promote economic growth (Al Nasser, 2010). In this respect, there is a dynamic relationship between FDI or, broadly, capital flows and economic growth.

Notwithstanding substantial evidence of the beneficial impacts of FDI on economic growth, Carkovic and Levine (2002) were unable to find any significant evidence linking FDI with economic growth. Interestingly, Gui-Diby (2014) showed that even though FDI exhibits a significant, favourable effect on economic growth for 50 African countries, the FDI benefits are not homogenous across the study period from 1980-2009. During the first 15 years, 1980-1994, FDI exerted a deleterious impact on economic growth for the sample countries. Only during 1995-2009, FDI produced a favourable impact on economic growth. Although Gui-Diby (2014) study may have addressed the endogeneity problem by applying the SGMM method, the study has some limitations because of the failure to control key important features of the domestic economic structure such as financial development and institutional quality. FDI's growth-enhancing effect is potentially over-estimated if the other growth-enhancing variables such as foreign aid and remittance or growth-harmful variables such as poor governance and corruption are not factored into the regression analysis (Borja, 2017).

According to Wei (2001) and Kose et al. (2011), FDI and portfolio equity flows are more stable than portfolio debt and bank lending flows and can amplify indirect benefits. Choong et al. (2010) demonstrated that FDI affects economic growth positively whereas portfolio inflows have negative effects. However, the authors argued that the portfolio flow effects would be positive if domestic financial market development reached a certain threshold level. Likewise, Reisen and Soto (2001), who analysed a panel of 44 countries from 1986-1997, revealed that FDI and portfolio equity flows positively affected economic growth but other capital flow forms did not. Beckmann and Czudaj (2017) showed the beneficial impacts of portfolio flows on economic growth in EMEs before the GFC; this agrees with the findings by Ferreira and Laux (2009). However, Beckmann and Czudaj (2017) failed to distinguish portfolio flows into portfolio equity flows and portfolio debt flows. One can hypothesise that portfolio equity may have a distinctly different effect from portfolio debt because the two flows are inherently different. Beckmann and Czudaj (2017) also found that portfolio flows are more beneficial for economic growth than FDI flows in EMEs. This contradicts the conventional view that FDI plays a more growth-enhancing role than portfolio flows because FDI is characteristically of long-term investments whereas portfolio flows typically display short-term and unstable characteristics. In contrast, Shen, Lee, and Lee (2010) provided empirical evidence of the unfavourable impacts of portfolio investment inflows on economic growth.

In a related fashion, little empirical research has investigated the link between portfolio equity flows and economic growth (Reisen & Soto, 2001). In many studies, portfolio equity flows are tied to portfolio debt flows as portfolio investment flows in the empirical analysis (Beckmann & Czudaj, 2017; Choong et al., 2010; Kyaw & Macdonald, 2009). Moreover, the impacts of other forms of capital flows (e.g., OI flows) on economic growth have, to the best of our knowledge, seldom been investigated. According to Pagliari and Hannan (2017), given the uncertainty of and variation in capital flows, it is essential to distinguish FDI and portfolio flows in investigating their independent impacts. In this regard, empirical analysis at the most granular level of capital flows is vitally important to understand the economic growth impacts of capital flows. More importantly, most previous studies analyse the impacts of different types of capital flows separately without considering their independent effects (Beckmann & Czudaj, 2017; Choong et al., 2010; Kyaw & Macdonald, 2009).

Role of absorptive capacity: Mixed results

The theoretical advantages of capital flows may not automatically translate into benefits without adequate and appropriate conditions. Recent literature indicates the important role of the absorptive capacity of the capital-receiving countries in not only reaping the benefits but minimising the costs of capital flows (Kose et al., 2011; Prasad et al., 2007). However, the empirical evidence is mixed. Whereas some studies advocate that countries possess absorptive capacity at a certain threshold to achieve the growth-enhancing benefits of capital flows (Eichengreen et al., 2011; Kose et al., 2011), there are studies that show conflicting evidence (Honig, 2008; van Hulten & Webber, 2010). Interestingly, Kose et al. (2011), who strongly supported the idea of absorptive capacity, acknowledged that threshold levels might vary according to changing global and local economic landscapes.

By investigating a sample of 14 Latin American economies between 1978 and 2003, Al Nasser (2010) found that FDI positively contributed to economic growth in those nations after controlling for key factors including the technological gap between the capital-exporting and capital-receiving countries and human capital. Similarly, Borensztein et al. (1998) showed that a definite threshold level of human capital was essential for developing countries to reap the benefits of FDI that contributed substantially higher than domestic investments to economic growth. Borensztein et al. (1998) examined FDI's growth-enhancing impact for a panel of 69 developing countries from 1970-1989 using a seemingly unrelated regression method. However, the study may suffer from endogeneity issues because some explanatory variables (e.g., FDI) may correlate with the error term. Simultaneity bias may also be a problem because high rates of economic growth possibly attract more FDI inflows.

Institutional quality is another important conditioning variable that may allow capital-receiving countries to derive the benefits of capital flows. Growing cross-border capital flows into developing economies are related to accelerated economic growth because of better capital access and institutional development (Ang & McKibbin, 2007; Kyaw & Macdonald, 2009; Rodrik et al., 2004). Poor institutional quality is arguably regarded as correlated with economic distortions that prevent the coordination of production inputs from achieving optimal outputs (Delgado et al., 2014). Corruption is an institutional quality dimension considered a critical factor bearing considerable effects on the capital flows-economic growth nexus. To evaluate the combined effect of capital account openness and corruption on economic growth, Kunieda et al. (2014) concluded that capital inflows are growth-enhancing for less corrupt countries but they are not beneficial for highly corrupt countries. However, Kunieda et al.'s (2014) study uses total external assets and liabilities scaled by GDP as a measure of capital account openness. A similar finding was revealed by Delgado et al. (2014) who examined the role of corruption in the FDI-economic growth nexus for 60 non-OECD countries from 1985-2002. They showed that developing countries appear to reap the benefits of FDI if corruption is considerably reduced. Kose et al. (2011), who used the simple average of the World Governance Index as a proxy of institutional quality, found that the negative growth effects of capital account openness change to positive when institutional quality is considered, but they examined financial integration only at an aggregated level. Despite the few empirical studies, the literature lacks a study that systematically examines the role of institutional quality in mediating the capital flows-economic growth nexus.

Although the role of absorptive capacity in cultivating the growth-enhancing effects of capital flows is somewhat agreed in the literature, some studies (Butkiewicz & Yanikkaya, 2008; Honig, 2008; van Hulten & Webber, 2010) provide contradictory evidence. These studies reject the hypothesis that the growth-enhancing impacts of capital flows are conditional on minimum levels of other key factors such as development stage, economic and political institutions, human capital, technological level, and trade or financial openness. For example, van Hulten and Webber (2010) found no significant evidence between 1984 and 2004 of a rigorous link between capital inflows and GDP growth for a group of 16 high-income economies with strong institutional arrangements. This interesting result is broadly commensurate with a study by Honig (2008) that found no robust evidence that capital account openness promotes higher or faster economic growth in countries with higher institutional quality. Butkiewicz and Yanikkaya (2008) suggested that the growth-enhancing effects of foreign capital inflows do not depend on threshold levels of the development stage, human capital, technological level, and country openness. Comparable results were recorded by Shen et al. (2010) who showed that the growth-enhancing effects of capital flows are reduced by financial sector development, human capital, and governance quality.

Investigation of the capital flows-economic growth nexus is related to another literature strand, the finance-economic growth nexus. Financial development is extremely crucial in promoting economic growth by disbursing scarce resources efficiently across a spectrum of sectors and firms to achieve sustained growth (Perkins, Radelet, Lindauer, & Block, 2013). In this regard, the financial system is considered an important domestic factor for capital-receiving countries to attain the benefits of capital inflows. When financial development is factored into empirical analysis, the countries with relatively high financial depth perform better than the countries with low financial depth (Camarero et al., 2017; Klein & Olivei, 2008). Klein and Olivei (2008) used three-stage least squares regression analysis on 21 OECD and 74 non-OECD nations from 1976-1995 to establish the link between financial liberalisation using a de jure measure and economic growth through the financial depth channel. The results showed that financial liberalisation contributed positively to economic growth in the subsample of OECD countries with a deeper financial system. Similarly, since domestic savings matter for growth (Aghion, Bacchetta, Ranciere, & Rogoff, 2009; Gente et al., 2015; Song, Storesletten, & Zilibotti, 2011), capital inflows appear to have larger growth effects for high savings countries than for low savings countries (Gente et al., 2015; Kose et al., 2011). Gente et al. (2015) provided additional evidence that capital flows are detrimental to economic growth for countries with low savings rates. This result, nevertheless, could be because of the heterogeneous development levels of financial systems across countries in the study sample.

The presumed growth benefits of capital flows for cross-country studies remain an open question, especially in developing countries where the degree of financial openness varies significantly from nascent to intermediate stages (Kose et al., 2011). In the literature, financial sector development has been relatively less examined in investigating the capital flows-economic growth nexus, especially in the EMDE context. According to Sahay et al. (2015), the impact of financial development on economic growth is bell-shaped. This finding seems to indicate that financial development may have a non-linear impact on the capital flows-economic growth nexus. Furthermore, it is imperative to test the threshold level of financial development in mediating the capital flows-economic growth nexus. Therefore, since there is no one-size-fits-all menu, it is highly relevant to analyse the role played by financial development in dealing with capital flow impacts on economic growth in EMDEs.

In summary, after controlling other essential conditioning variables such as technological gap, financial development, and institutional quality, the empirical evidence for the growth-enhancing effects of capital account openness or capital flows is far from a consensus. According to Honig (2008), one explanation for the mixed results is possibly reverse causality from economic growth to capital inflows. Because this reverse causation creates an endogeneity problem, the estimation of the capital flows-economic growth model using ordinary least squares (OLS) or fixed effect (FE) methods yields biased, inconsistent estimates.

Different empirical methods, different results

Empirical analysis of the capital flows-economic growth nexus initially started from cross-sectional growth regression analysis. Earlier empirical work uses the OLS technique to estimate the cross-country growth regression models (Borensztein et al., 1998; Bosworth et al., 1999). Next, panel data approaches using different estimators such as fixed effect, random effect, and two-stage least squares (2SLS) methods were used to account for both cross-country and time series variations (Bekaert et al., 2011; Li & Liu, 2005; Shen et al., 2010). Consequently, prior empirical work tends to suffer from endogeneity issues because of the failure to account for the dynamics of economic growth, simultaneity bias, and/or omitted variables. It is worth noting that the capital flows-economic growth relationship is possibly bi-directional; this is well acknowledged in the literature (Al Nasser, 2010; Iamsiraroj, 2016). Endogeneity can thus result from failure to consider reverse causation in modelling the capital flows-economic growth nexus. Moreover, according to Eng and Wong (2016) and Beckmann and Czudaj (2017), the impacts of capital flows seem to be heterogeneous across countries and periods, which can affect the estimation results of the capital flows-economic growth regressions.

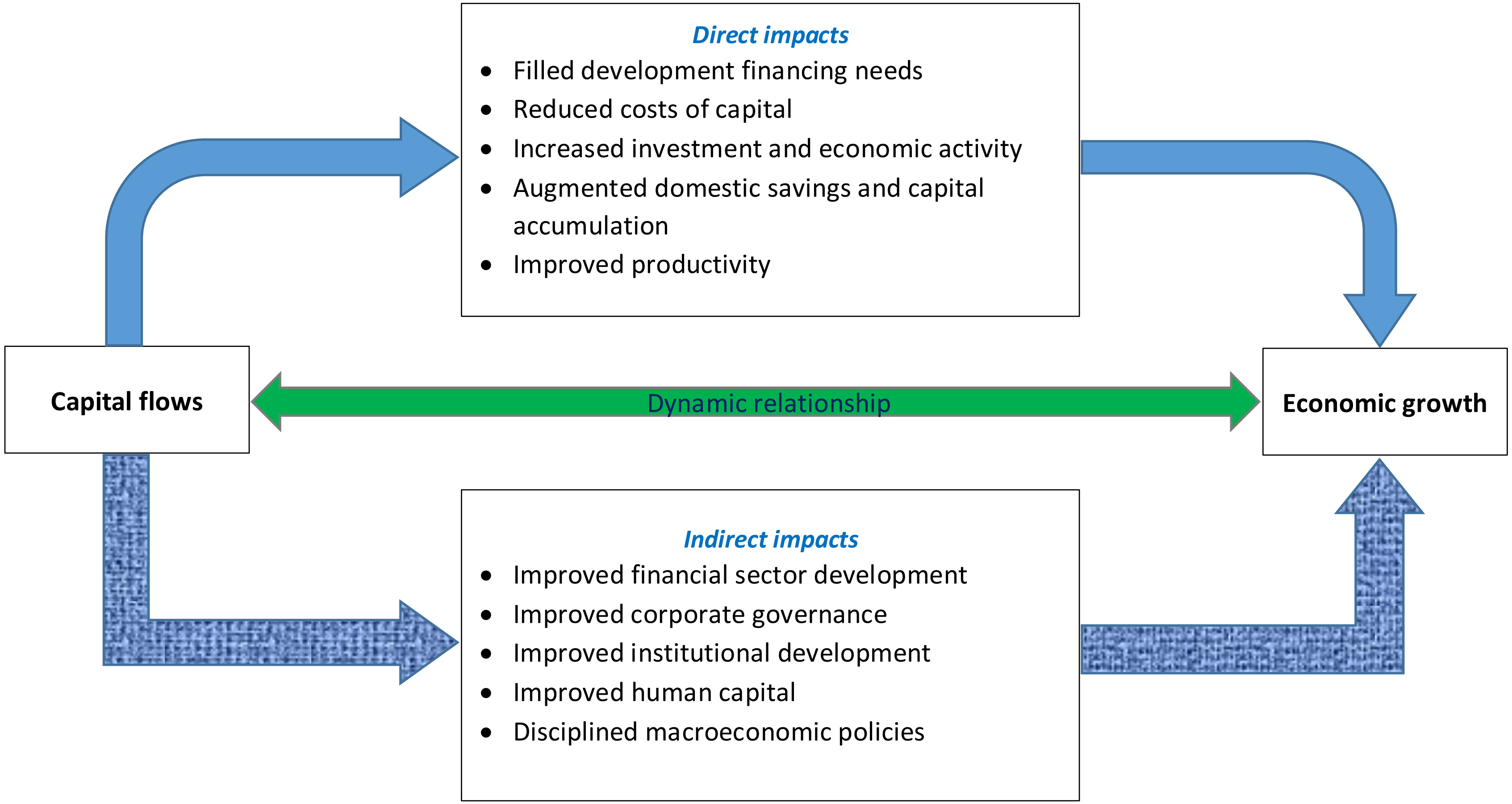
Recent studies apply dynamic panel data approaches to account for the dynamic characteristics of economic growth. By conducting a dynamic panel data analysis in the EU context, Gehringer (2015) provided empirical evidence of the growth-enhancing impacts of capital flows. However, Gehringer's (2015) study examines only eight advanced EU countries that are well integrated with well-functioning economic and financial systems and well-developed institutions. It is commonly accepted that advanced economies, which are categorically equipped with a stronger financial sector, more stable macroeconomic policy and better institutions than their developing counterparts, have received the largest gains from worldwide financial openness (Kose et al., 2011). Kyaw and Macdonald (2009), who investigated a group of 126 developing economies from 1985-2002 using dynamic panel data techniques, found that capital flows exert positive effects on economic growth. However, Kyaw and Macdonald's (2009) study does not consider the roles of the absorptive capacity of the capital-recipient economy such as financial development and institutional quality in linking capital flows and economic growth.

2.4.3 Concluding remarks

According to the neo-classical growth model, capital flows are predicted to promote economic growth in capital-recipient economies. From the literature review, the growth-enhancing effects of capital flows work through either direct or indirect channels as summarised in Figure 2.1. Directly, capital flows are vitally important in lowering the capital costs and fulfilling the financial resource needs for investment, which would result in higher economic growth. Moreover, capital inflows help capital-recipient economies to accumulate capital stock and enhance either labour productivity or total factor productivity. Indirectly, capital flows are a catalyst in promoting financial sector development, corporate governance, institutional development, human capital enhancement and macroeconomic policy disciplines. The capital flows-economic growth link is largely agreed to be dynamic. This means capital flows can impact economic growth, which, in turn, serves as a determinant of capital flows.

However, the literature on the capital flows-economic growth nexus is inconclusive. Neither theoretical analysis nor empirical work provides clear results. The empirical analyses have suffered from various issues. First, endogeneity and reverse causality are rather pervasive. Second, the roles of other key factors, including financial development, institutional quality, human capital, development stage and trade openness, have not been factored into the analysis. Third, different country samples and timespans have been used. Fourth, even though various econometric techniques can cope with time variation, the study timespan remains a suspect cause of the inconclusive results. The fifth important problem may be the failure to disaggregate capital flows into different components that may hypothetically have distinct impacts. The mixed empirical results may arise from the failure to account for the capital flow composition or the independent effects of each capital flow component.

Figure 2.1 The conceptual framework of the capital flows-economic growth nexus



Source: Author's illustration based on the literature.

2.5 Capital Flows–Domestic Credit Growth Nexus

This section discusses the conceptual framework of the capital flows-domestic credit growth link. The literature review related to this important relationship is then considered. The section ends with a conclusion drawn from the literature review.

2.5.1 Theoretical perspective

"Domestic credit to the private sector" or "private credit" refers to financial funds acquired by the private sector, including households and firms, from financial institutions through various channels such as loans, purchases of non-equity securities, trade credits and account receivables (Kim, 2016). In many countries, private credit also includes credit provisions to state-owned enterprises. Hence, credit growth is the expansion of the total credit supply in the economy. Expansion of the credit supply can be significantly large in a short period called "rapid credit growth." Abnormally excessive rise in credit growth, which can be driven by swift credit expansion, is referred to as a "credit boom" (Sa, 2006).

Domestic credit expansion in an economy can be interpreted as either a positive or negative development. On one hand, a rise in credit growth can reflect enhanced macroeconomic prospects and long-run economic growth (Arena, Bouza, Dabla-Norris, Gerling, & Njie, 2015; Levine, 1997). It can also indicate strengthening of financial depth and access, especially in the countries where financial markets are shallow (Arena et al., 2015), as argued by Levine (1997) that credit growth plays a crucial function in promoting financial depth.

On the other hand, a rise in credit growth, especially a fast-growing credit supply, may be a sign of increasing credit risk, an asset price bubble and a financial and banking crisis (Arena et al., 2015; Kim, 2016). Rising credit growth could be a warning of macroeconomic and financial risks to the economy (Arena et al., 2015). Based on historical experience, accelerating credit growth is followed closely by boom-and-bust cycles and financial crises (Gourinchas & Obstfeld, 2012; Schularick & Taylor, 2012). The fast pace of the strengthening of financial depth can cause higher volatility of economic growth and financial instability (Sahay et al., 2015) and macroeconomic overheating.

Increased capital flows can theoretically accelerate domestic credit growth in capital-recipient economies. There are multiple important channels by which capital flows can produce expansion of credit supply in capital-recipient economies (Lane & McQuade, 2014). First, the surge in capital flows generates more liquidity and lendable funds in the economy that can be used to provide credit to households or firms. Some proportion of the capital inflows can make its way straight into the financial and banking system that would convert it into credit (Lane & McQuade, 2014). When the pool of local funding and deposits falls short of the growth of domestic credit, banks and financial institutions resort to international capital markets or borrow from their subsidiaries or parent banks/financial corporations abroad. As a result, capital inflows increase and further accelerate the local credit supply. When domestic banks or financial institutions obtain foreign borrowings and use the funds for domestic lending, domestic credit supply generally increases. Alternatively, a surge in capital inflows can result in considerable liquidity expansion that could lead to deteriorating lending standards (Arena et al., 2015). Banks and financial firms are prompted to disburse more loans in periods of abundant liquidity to maximise their profit. This phenomenon would be amplified by stronger competition in the banking sector, especially in a market with a significant number of foreign banks (Arena et al., 2015).

Second, capital inflows can give rise to asset prices. Assets of higher values could be utilised as collateral for more borrowings (Lane & McQuade, 2014). Households or firms can borrow more from banks or financial institutions against their existing assets that have higher values; hence, domestic credit supply expands. The rise in asset prices, for instance, would increase the net worth of firms' assets, thereby allowing them to obtain more borrowings.

Third, capital inflows can potentially reduce domestic long-term interest rates. As a result, credit expansion is accelerated (Akyüz, 2012). Because of a surge in capital inflows, domestic interest rates could decrease; thereby increasing domestic credit demand by firms and households. According to the Bank for International Settlements (BIS, 2011), long-term domestic interest rates are not only determined by domestic factors such as monetary policy but also by external factors, such as international savings and investment conditions.

2.5.2 Empirical evidence

Multiple studies have investigated the macroeconomic impacts of domestic credit growth and credit booms as well as the causal relationship between rapid credit expansion or credit booms and financial crises. Financial crises often follow rapid credit expansion (Gourinchas & Obstfeld, 2012; Hernández & Landerretche, 2002; Jordà, Schularick, & Taylor, 2015; Jordà, Schularick, & Taylor, 2012; Schularick & Taylor, 2012), which are typically financed by overseas borrowings (Akinci & Queralto, 2014; Bruno & Shin, 2013; Mendoza & Terrones, 2012). Based on historical anecdotes, many financial crises were the result of the swift expansion of bank credit that was often financed by surges in capital inflows. The crises include the Chilean crisis in the 1970s, Mexico in 1994-95, and the Asian financial crisis 1997-1998 (Hernández & Landerretche, 2002). The recent European economic malaise, after the 2008-2009 GFC, was because of excessive external imbalances and balance-sheet issues corresponding with speedy credit expansion in several economies such as Spain and Ireland in the pre-crisis period (Lane & McQuade, 2014). This evidence is consistent with Lane and Milesi-Ferretti's (2011) study, demonstrating that the magnitude of the recession in Europe in 2008-09 was significantly connected with the pace of credit expansion as well as the magnitude of outstanding current account imbalances between 2003 and 2008.

Few studies have examined international capital flows as a driver of domestic credit growth. A substantial increase in capital inflows provides a large amount of financial resource that can be used as loans in the domestic economy and credit growth in the domestic economy will be accelerated (Lane & McQuade, 2014). Credit growth is an important channel that capital inflows can affect the financial and real sectors of capital-recipient economies. Based on experience, interactions between cross-border capital flows and credit growth have negative repercussions for macro-financial stability (Arena et al., 2015; Gourinchas & Obstfeld, 2012; Sahay et al., 2015). Therefore, it is important to examine such a driver of domestic credit growth as capital flows to understand the macro-financial impacts of capital flows on the capital-recipient economies and, thereby, design effective policy measures to contain unsustainable credit growth and ultimately prevent financial instability.

Capital flows and credit boom or credit growth: Mixed results

Only a few studies have investigated the drivers of credit growth, which include external factors (e.g., capital inflows, international interest rates) and internal factors (e.g., monetary policy stances, domestic interest rates). Employing event studies of 99 credit booms from 1960 to 2010, Elekdag and Wu (2011) discussed the roles of internal and external factors in driving credit booms. Their results suggest that large capital inflows are correlated with credit booms and domestic factors, particularly loose monetary policy, also play an important role.

Arena et al. (2015) suggested that the more integrated to the global economy a country is, the higher the probability of credit booms. Credit booms are positively correlated with either domestic or international factors. Capital inflows and favourable global liquidity conditions have an enormous positive bearing on credit booms in a domestic economy (Arena et al., 2015). Credit growth was examined by Bruno and Shin (2013) through cross-country analysis as a consequence of global liquidity and leverage cycles.

A rise in capital inflows is likely to trigger a credit boom. Based on an exploratory study of 60 developing and developed countries between 1970 and 1995, Hernández and Landerretche (2002) showed that credit booms are often preceded or accompanied by large capital inflows. Despite that noticeable finding, the authors took into account only periods of credit booms based on subjective numerical determination and positive capital inflows over two consecutive periods (i.e., mathematically, t and t-1 periods). More importantly, no empirical proof of causality between capital inflows and credit booms was found.

Hernández and Landerretche's (2002) finding was supported by Mendoza and Terrones's (2012) study covering 61 industrial and emerging market economies that showed a significant association between net capital flows and domestic credit booms. However, they considered only the aggregate net capital flows and the behaviour of net capital flows during credit booms rather than periods of low or negative domestic credit growth.

A rise in gross debt inflow is likely to be followed by episodes of domestic credit booms. Using panel probit regressions on a sample of 71 advanced and emerging economies from 1975Q1-2010Q4, Calderón and Kubota (2012) showed that other investment flows – the major component is cross-border lending or debt flows – are powerful predictors of the likelihood of lending booms but FDI and portfolio investments have no decisive predictive power. The predictive power of other investment flows remains invariant to different criteria of credit booms and sample countries. Moreover, the other investment flows exhibit substantial power in predicting bad booms that usually end up with systemic banking crisis whereas portfolio investments have less power. In contrast, FDI can, perhaps, help mitigate bad booms. This finding received support from Lane and McQuade's (2014) study that analysed 54 advanced and emerging European countries and found that net debt inflows are highly correlated with domestic credit growth but net equity inflows were not.

The likelihood of capital inflows causing credit booms in EMDEs is higher than the likelihood that they do not have any impact on credit booms (Hernández & Landerretche, 2002). More importantly, capital inflows are more important in inducing credit booms in developing countries than in developed countries (Hernández & Landerretche, 2002). This was reinforced by Calderón and Kubota (2012), who demonstrated that the probability of lending booms is greater in developing countries than in industrial counterparts. The likelihood of bad credit booms appears to be more frequent in developing countries than in advanced countries (Calderón & Kubota, 2012). Based on their empirical analyses, Calderón and Kubota (2012) found that a third of the credit booms identified throughout 1975-2010 were bad booms in developing countries but it was only about one-sixth in advanced countries.

By contrast, Sa (2006), who deployed Granger causality test method to explore the capital inflows-credit boom linkage in 22 EMEs from 2002-2006, was unable to detect any evidence that capital inflows caused credit booms. Based on Granger causality tests, the results varied for different countries. Similarly, Amri, Richey, and Willett (2016) demonstrated that the relationship between a capital inflow surge and a credit boom is not as strong as is often believed. The authors argued that previous studies failed to conduct adequate tests of the robustness of the results with either distinctive measures of capital flow surges or credit booms. Hence, it is difficult to generalise that capital inflows cause credit booms or domestic credit growth. More importantly, there is no literature consensus on the definition of a credit boom (Calderón & Kubota, 2012). Multiple different measures of credit booms have been used in analyses (Barajas, Dell'Ariccia, & Levchenko, 2007; Gourinchas, Valdes, & Landerretche, 2001; Mendoza & Terrones, 2008; Tornell & Westermann, 2002). Credit booms are rather subject to numerical designation. Furthermore, Sa (2006) argued that it is difficult to reach a consensus conclusion that capital inflows can cause credit booms and eventually result in accumulating risk of financial instability because, for some countries, substantial capital inflows are conducive to a vigorous financial deepening.

Absorptive capacity may have a role to play: Lack of empirical evidence

It is generally believed that international capital inflows are a major propeller of domestic credit growth (Duenwald, Gueorguiev, & Schaechter, 2005; Hansen & Sulla, 2013). However, the direct relationship between the two variables has rarely been studied. Interestingly, a multi-country analysis of the relationship is under-explored. By applying a structural VAR model to the Australian economy, Raghavan, Churchill, and Tian (2014) found that a positive shock to debt flows has a significantly positive impact on domestic credit growth and other macroeconomic fundamentals including higher aggregate demand and real exchange rate appreciation. This result resonates well with Lane and McQuade's (2014) findings. Using a sample of 30 European countries, Lane and McQuade (2014) demonstrated that debt flows have stronger positive impact than equity flows on credit growth. This relationship was also examined for Turkey between 2005 and 2013 and, among different forms of capital inflows, bank flows appeared to have the greatest influence on the expansion of credit supply (Baskaya, Di Giovanni, Kalemli-Özcan, Peydro, & Ulu, 2017).

Using a 2SLS technique on 21 advanced and emerging economies from 2000-2015, Kim (2016) found that portfolio inflows had a huge influence on driving the impacts of credit growth on credit risk, especially for seven Asian EMEs. Kim (2016) classified the 21 sampled countries into three groups: developed economies (G7 economies); emerging Latin American and European economies; and emerging Asian economies. However, Kim's (2016) study did not control for the different levels of economic development and financial sector between advanced economies and EMEs.

By controlling for the development level and structure of the financial system, Igan and Tan (2017) provided empirical evidence that capital inflows were positively associated with domestic credit growth. The result remained unchanged when capital inflows were disaggregated into FDI and non-FDI. This evidence seems to indicate the essential role played by the financial system in mediating the capital flows-credit growth link since Goldfajn and Valdés (1997) revealed that the impacts of capital flows are amplified via banks.

The exchange rate regime may also play a crucial role in the dynamics of the capital inflows-credit growth link. Boudias (2015) analysed 22 EMEs from 1980-2010 and found that the expansion of credit supply is procyclical in the fixed exchange rate regime. Boudias (2015) further argued that exchange rate flexibility permits monetary authorities to deploy some counter-cyclical measures to cope with substantial capital inflows although the author did not formally test whether exchange rate flexibility can mediate the link between capital flows and domestic credit growth. This view is similar to that of Combes et al. (2012) who showed that exchange rate flexibility is important in addressing the real exchange rate appreciation effects of capital inflows.

Institutional quality is a critical factor in understanding the effects of capital flows on economic performance in capital-recipient economies (Borja, 2017; Kunieda et al., 2014). It may have a role to play in the capital flows-domestic credit growth link. It is worth noting that corruption, a fundamental dimension of institutional quality of a host economy, is viewed as a push factor of the growth of non-performing loans in the banking systems of many countries (Akins, Dou, & Ng, 2017; Park, 2012). Poor institutional quality (e.g., high corruption level) in the capital-recipient economy may magnify domestic credit expansion triggered by capital inflows. More importantly, the role of institutional quality in mediating the capital flows-domestic credit growth nexus has never been considered.

2.5.3 Concluding remarks

Capital inflows theoretically result in higher credit expansion through several mechanisms such as increasing liquidity or lendable funds, lower long-term interest rates, and rising asset prices, which are utilised as collateral for more borrowing (Akyüz, 2012; Lane & McQuade, 2014; Sahay et al., 2015). The relationship is also conditional on the domestic financial or banking sector situation. When the banking market competition is strong, credit expansion may be accelerated by capital inflows. In addition, capital inflows can cause substantial credit growth because of loosening lending standards, especially in developing countries where banking supervision and regulation are weak.

This review points out a few critical gaps in analysing the capital flows-domestic credit growth link. Firstly, the discussion on the macro-financial impacts of credit growth or credit booms has paid little attention to the driving forces such as capital flows. Capital flows could be a factor in the cross-country differences in domestic credit growth and its associated ramifications such as bank runs or financial crises. Secondly, the empirical results of the capital flows-credit boom link are somewhat inconclusive. Though some studies (Calderón & Kubota, 2012; Hernández & Landerretche, 2002; Mendoza & Terrones, 2012) provide findings of positive impacts of capital inflows on credit booms, other studies show no evidence (Amri et al., 2016; Sa, 2006). The mixed results may be for a couple of reasons. The first important reason is that there is no unified definition of "credit boom." It is subject to numerical determination by individual researchers. The second reason may be the failure to consider other important economic fundamentals such as financial development, exchange rate regime, and institutional quality, in analysing the capital flows-credit boom link. Thirdly, no study establishes the direct relationship between capital flows and domestic credit growth in EMDEs. Although Igan and Tan (2017) provided a granular examination of this nexus, their study covered only 33 countries including both advanced and emerging market economies and used annual data from 1980-2011. It can be hypothesised that advanced economies and EMDEs have significantly different characteristics that may affect the empirical results. Furthermore, Igan and Tan's (2017) study did not account for the interactions between capital flows and other major economic fundamentals including exchange rate regime and institutional quality.

In conclusion, as the ramping-up of the domestic credit growth rate is a first-order problem concerning policymakers, many studies have investigated the macroeconomic impacts of credit growth or credit booms as well as the relationship between credit growth or credit booms and financial crises (Bruno & Shin, 2013; Gourinchas & Obstfeld, 2012; Schularick & Taylor, 2012). However, the link between capital flows and domestic credit growth has seldom been directly examined. In the literature, it is generally viewed that capital inflows are a major driver of domestic credit expansion but the extent to which capital inflows contributed to domestic credit growth is less studied. Therefore, given the devastating costs of credit boom-and-bust cycles (IMF, 2011), the capital flows-domestic credit growth nexus should be closely examined.

2.6 Capital Flows–Real Exchange Rate Nexus

This section presents the conceptual framework and literature review related to the capital flows-real exchange rate nexus. The section begins with a discussion of the theoretical perspectives on this critical relationship and is followed by a review of the empirical literature and concluding remarks.

2.6.1 Theoretical perspective

Economies that are financially integrated into the world economy, irrespective of the exchange rate regime, are affected by global financial conditions thereby reducing the independence of their monetary policies unless the capital account is managed (Rey, 2015). Global financial conditions have pervasive effects on EMEs, including through the impact on exchange rates (Blanchard, Adler, & Filho, 2015).

In theory, though capital flows can provide potential substantial benefits, there are considerable risks that can translate into negative impacts for capital-recipient economies such as EMDEs. The real exchange rate appreciation is one of the main costs that jeopardises capital-receiving countries by wearing down their export sector's competitiveness (Bakardzhieva et al., 2010; Corden, 1994; Lartey, 2007). This is generally viewed as the “Dutch disease,” the negative externalities of booming natural resource revenues or capital influx on the competitiveness of the tradable sectors (Bakardzhieva et al., 2010). Along with fast-growing economic growth and inflation, real exchange rate appreciation is a major cause of macroeconomic overheating (Combes et al., 2012).

Capital inflows have been identified as a determinant of the exchange rate movements in many studies (Aron, Elbadawi, & Kahn, 1998; Combes et al., 2012; Elbadawi & Soto, 1997; Jongwanich, 2010). Based on exchange rate determination models, capital flows hold considerable influence over real exchange rates (Combes et al., 2012). A significant increase in capital inflows can cause higher demand for either tradable or non-tradable goods, leading to real exchange rate appreciation if the prices of tradable goods increase at a lower rate than the prices of non-tradable goods fuelled by the higher demand (Combes et al., 2012; Corbo & Fischer, 1995).

Appreciation of the real exchange rate can happen irrespective of the exchange rate regime conducted in the economy. Under a fixed or pegged regime, the real exchange rate appreciation is rising inflation because the prices of non-tradable goods rise relatively higher than the prices of tradable goods. Under a flexible exchange rate regime, the real exchange rate appreciation occurs through the increase in the nominal exchange rate. In the context of an intermediate regime, such as managed floating or crawling peg regimes, the real appreciation happens by a combination of these two features (Erten & Ocampo, 2017; Jongwanich & Kohpaiboon, 2013).

There is an important distinction between nominal and real exchange rates. Whereas the nominal exchange rate measures monetary differences between home and foreign currencies, the real exchange rate is expressed as the relative price of tradable goods with regard to non-tradable goods (Edwards, 1989). Because of the difficulty of practical application, the real exchange rate is operationally defined as the difference between the price in the home country and a foreign country adjusted by the nominal exchange rate.

2.6.2 Empirical evidence

The capital flows-real exchange rate nexus continues to be a critical macroeconomic question. It has become even more pronounced since the GFC erupted in 2008 and because more EMDEs are susceptible to rapid changes in the patterns and developments of global capital flows. This section reviews the literature related to this important topic.

Several studies have shown that capital flows can drive appreciation of the real exchange rate (Combes et al., 2012; Elbadawi & Soto, 1994; Jongwanich, 2010; Lartey, 2007) even though only a few studies have been conducted. At the same time, there are studies that are unable to provide compelling evidence that capital flows lead to real exchange rate appreciation or, at worst, they provide conflicting evidence (Athukorala & Rajapatirana, 2003; Bakardzhieva et al., 2010).

Capital flows, either private or public, can generate real exchange rate appreciation according to Combes et al. (2012), whose study uses panel co-integration techniques and covers 42 developing countries from 1980-2006. An increase in capital flows, scaled by GDP, by a percentage point can increase the real effective exchange rate by 0.13% (Combes et al., 2012). It is interesting to note that official capital flows can generate a higher real appreciation effect than the private capital flow counterpart because official capital flows pass more to public consumption, typically in the non-tradable sector, whereas private capital flows are more directed towards investments in productive sectors. This result agrees with Jongwanich (2010), who employed a dynamic panel framework for nine emerging Asian countries between 2000 and 2009 and showed that private capital flows exerted sizable appreciation effects on the real exchange rate. The rapid influx of capital, specifically portfolio investment and bank flows, causes considerable appreciation of the real exchange rate in the Asian region. Jongwanich (2010) further revealed that when bank flows are analysed separately from the other forms of capital flows, they have as significantly large effects on the real exchange rate appreciation as portfolio flows. However, Combes et al. (2012) showed that when bank flows are combined with FDI flows, they have less real appreciation effect than portfolio investment flows.

It is difficult to find unambiguous evidence regarding the real appreciation effects of capital flows at the aggregate level. Some studies detected no evidence that capital flows can generate real exchange rate appreciation (Athukorala & Rajapatirana, 2003; Bakardzhieva et al., 2010). Capital flow composition may be strongly relevant in analysing the effects of capital flows on the real exchange rate. Different forms of capital flows may have distinctive effects on the real exchange rate in capital-recipient economies (Bakardzhieva et al., 2010) although there is still less evidence (Combes et al., 2012).

Different types of capital flows, different impacts: Mixed results

FDI's impact on the real exchange rate remains debatable. Some studies find that FDI has real appreciation effects whereas others are unable to detect any noteworthy evidence. According to Jongwanich (2010) and Combes et al. (2012), FDI has a real appreciation effect even though the magnitude is smaller than portfolio and other investment flows. This result is similar to that of Saborowski (2009) whose study covers 85 developed and developing economies between 1997 and 2006. The author found that FDI has a strong real appreciation effect but the real appreciation effect can be reduced by a deepening of the financial sector. Saborowski's (2009) result may suffer from estimation bias because the number of instruments in the SGMM estimation is much higher than the number of panel units. This proliferation of instruments in the model estimation does not satisfy one major conditions of the SGMM estimator as emphasised by Roodman (2009b).

Lartey (2007) analysed 16 Sub-Saharan African nations between 1980 and 2000 using the SGMM method to estimate a dynamic panel data model and found that FDI caused the real exchange rate to appreciate in the sample economies although it had a smaller effect than aid flows. This finding parallels the study by Elbadawi and Soto (1994) that revealed that FDI has a substantial impact on the real exchange rate appreciation in Chile. Lartey's (2007) study failed to control for important economic fundamentals such as exchange rate regime, financial sector development, income level and the interactions between capital flows and these economic fundamentals.

According to Athukorala and Rajapatirana (2003), whose study covered Latin American and South and East Asian countries, FDI inflows generate real exchange rate depreciation whereas non-FDI inflows lead to real appreciation with stronger effects in Latin American economies than in Asian economies. As explained by the authors, FDI appears to be more directed to tradable sectors than other types of capital flows. FDI generates less money expansion and credit because it is less or only briefly mediated via domestic financial systems. FDI can, moreover, generate spill-over effects such as technology transfer and managerial know-how that could lead to improvement of local productive capacity and thereby exerts less pressure on the real exchange rate (Combes et al., 2012). It is worth noting that Bakardzhieva et al. (2010), whose study applies dynamic panel techniques to 57 developing countries, showed that FDI had no effect on the real exchange rate. These authors argued that FDI inflows may lead to appreciation of the real exchange rate in the short run, but its effect diminishes over time as some components of the flows are converted into the import of capital goods such as machinery and technological tools. Besides, when the FDI inflows contribute to higher economic production, the pressure on domestic prices, and eventually the real exchange rate, declines. Sintim-Aboagye, Chakraborty, and Byekwaso (2017), who applied Granger causality tests, showed that the FDI-real exchange rate relationship is bi-directional. This finding indicates a two-way relationship between FDI or, broadly, capital flows and the real exchange rate. The failure to recognise this feature in modelling the linkage of the two variables may suffer from an endogeneity issue that would produce biased, inconsistent estimates.

Portfolio investment flows have recently played a progressively significant part in the rising financial globalisation. They have become a steady driver of the development of foreign exchange markets, investment and employment (Ouedraogo, 2017). Portfolio investments can be either beneficial or problematic for the capital-recipient economy. On the one hand, they are a vital source of financing for the private and public sectors. On the other hand, they generate deleterious effects on the host economy because a substantial influx of portfolio investments can appreciate the real exchange rate and ultimately destabilise the economy. The empirical literature remains inconclusive in evaluating the impact of portfolio investment flows on the real exchange rate. Several studies (Athukorala & Rajapatirana, 2003; Bakardzhieva et al., 2010; Combes et al., 2012; Jongwanich, 2010) showed that portfolio investment flows generate appreciation effects on the real exchange rate and the effect is significantly stronger than other forms of capital flows. The real exchange rate appreciation effect of portfolio inflows is the highest and is roughly seven times that of FDI or bank flows (Combes et al., 2012). Based on the analysis of disaggregated capital flows, Jongwanich (2010) showed that portfolio and other investments have a stronger effect on real exchange rate appreciation than FDI. Portfolio investment flows are generally considered short-term, highly volatile financial flows that can suddenly surprise the capital-recipient economy. Given the short-term and volatile characteristics, portfolio investment flows tend to cause real exchange rate fluctuations. In brief, portfolio investment flows are characteristically different from FDI and bank flows because the latter flows are significantly associated with expansion of the productive capacity of the host economy (Combes et al., 2012).

According to Elbadawi and Soto (1994), who undertook an analysis of Chile using annual data from 1960 to 1992 with a cointegration technique, provided empirical evidence that portfolio investment and other short-term capital inflows did not cause any misalignment of the equilibrium real exchange rate. They further showed that only long-term capital inflows cause the real exchange rate to appreciate with sizable effects. However, according to Bakardzhieva et al. (2010), the portfolio inflows and real exchange rate relationship has so far received little attention. More importantly, there is no research analysing the real appreciation effects of portfolio investment inflows at a disaggregated level such as portfolio equity and portfolio debt. It can be hypothesised that the behaviour of portfolio equity is different from that of portfolio debt, thus the ramifications for the real exchange rate in the host economy are also disparate. Hence, it is essential to examine separately the effects of portfolio equity flows and portfolio debt flows on the real exchange rate. To the best of our knowledge, there is only a study by Hau, Massa, and Peress (2009), using an event study technique, that provides evidence of the effect of portfolio equity inflows on nominal exchange rate appreciation. However, Hau et al. (2009) used MSCI Global Equity Index data rather than the actual volumes of portfolio equity flows so it may not capture the effects of portfolio equity flows well because information on portfolio equity flow movements are not fully reflected in the index. More importantly, an event study is unable to show causality between two variables.

Other types of capital flows including remittance and foreign aid: Mixed results

Remittances contribute to real exchange rate appreciation (Acosta, Lartey, & Mandelman, 2009; Amuedo-Dorantes & Pozo, 2004; Hassan & Holmes, 2013). In an attempt to establish both long- and short-run relationships of the remittance-real exchange rate nexus, Hassan and Holmes (2013) analysed 24 high remittance-recipient countries between 1987 and 2010 using a range of panel-data methods. The authors revealed that the real appreciation effect of remittances in the long run is smaller than in the short run. For the long run, when remittances increase by one percent, the real exchange rate appreciates by around 0.48% (Hassan & Holmes, 2013). However, the result may suffer from simultaneity bias because the causality can also run from the exchange rate to the remittance; other important confounding factors, such as exchange rate regime, are not considered in the analysis. Amuedo-Dorantes and Pozo (2004), who analysed 13 Latin American nations, found that increased remittance inflows resulted in the appreciation of real exchange rate. Similar findings were uncovered by subsequent researchers (Holzner, 2006; Lopez, Bussolo, & Molina, 2007) although the quantitative effects were varied. Despite covering a larger sample of countries, two later studies (Acosta, Baerg, & Mandelman, 2009; Acosta, Lartey, et al., 2009) provided similar evidence that a remittance surge can cause real exchange rate appreciation. Both studies covered an unbalanced panel of 109 developing countries from 1990 to 2003. It is worthwhile noting that remittances, which are the major component of private transfers, have the least appreciation effect on the real exchange rate (Combes et al., 2012).

In contrast, other studies provide empirical evidence that contradicts previous research. For instance, Barrett (2014) found that remittance inflows generated a real depreciation effect in Jamaica in the study period 1995-2010. When remittance as a share of GDP rose by a percentage point, the real exchange rate depreciated by approximately 8.36%. Similarly, Rajan and Subramanian (2005), applying the difference-in-difference method to a sample of 33 economies between 1980 and 2000, found that remittances did not have a real exchange rate appreciation effect. One possible explanation is that remittances are largely used in the low-skilled and tradable sectors. Another possible reason is that, because of an overvalued exchange rate in their home countries, emigrants discontinue or reduce transferring their money home; that means the causality runs from exchange rate to remittance.

The literature shows that the evidence of the remittances' impact on the real exchange rate diverges. The divergent results may be attributable to different countries, timespan, econometric methods and variable measurements. It can also be attributable to the failure to include key important factors of the remittance-recipient economies such as development stage, exchange rate regime, financial development, macroeconomic policy management and institutional quality. Furthermore, the role of remittances in domestic economies may depend on the nature and magnitude of the remittance (Bakardzhieva et al., 2010). In summary, research on remittances is still at its nascent stage; there has been limited scholarly attention to the topic (Rajan & Subramanian, 2005).

Several researchers have undertaken multi-country analyses of the foreign aid-real exchange rate linkage. Using a sample of 62 developing countries, Elbadawi (1999) showed that when aid flows increased by 10%, the real exchange rate appreciated by approximately 1%. The large inflows of foreign aid to post-conflict countries have had a moderate appreciation effect on the real exchange rate as shown in a panel study of 83 countries from 1970-2004 by Elbadawi, Kaltani, and Schmidt-Hebbel (2008). Similarly, Prati and Tressel (2006) revealed that the real appreciation effect of aid inflows was significantly strong as postulated by the "Dutch disease" theory. This finding corroborates an earlier finding by Adenauer and Vagassky (1998) who, using the generalised least squares method, revealed that aid inflows from 1980 to 1992 contributed strongly to the real exchange rate appreciation in a sample of four African nations.

In contrast, some other studies were unable to detect any evidence that foreign aid inflows led to real exchange rate appreciation. Berg, Hussain, Aiyar, Roache, and Mahone (2005) showed that aid inflows caused no appreciation effect on the real exchange rate for five African countries. The reason for the absence of real exchange rate appreciation was because of the authorities' active roles in managing the aid inflows into the five countries. Fielding (2010), conducting an analysis on 10 Pacific economies with a conditional VAR method, provided ambiguous results. Bakardzhieva et al. (2010) revealed that the aid flows' impacts on real exchange rate varied across regions.

A surge in aid inflows is a contributing factor to the real exchange appreciation (Arellano, Bulíř, Lane, & Lipschitz, 2009). As argued by the authors, however, the real appreciation effect may be dampened if domestic capital markets are better developed to allow better flows of financial resources between economic sectors. This is broadly in line with some other studies that argue for consideration of other variables in analysing aid inflows' impacts on the real exchange rate. The real exchange appreciation impact of aid inflows is conditional on the composition and use of foreign aid and related policy responses (Gupta, Powell, & Yang, 2005). The composition of foreign aid expenditure is a crucial factor in determining the real effective exchange rate's reaction to the aid inflows (Adam & Bevan, 2003).

Analysis of the foreign aid-real exchange rate nexus provides inconclusive evidence. The disparity may be explained by different sampled countries and/or sample period. It may also be attributable to a failure to account for economic factors in the aid-receiving countries or the modelling techniques. Therefore, the linkage between aid inflows and real exchange rate warrants further investigation.

Absorptive capacity may have a role to play: Lack of empirical evidence

Even though financial development is greatly praised for its importance for economic growth and development as evidenced by the large literature volume (Beck, Demirgüç-Kunt, & Levine, 2000; Beck & Levine, 2004; King & Levine, 1993; Levine, 1997; Levine, Loayza, & Beck, 2000; Levine & Zervos, 1998), the role of financial development as a conditioning factor in the capital flows-real exchange rate link has been marginally examined. It is worthwhile noting that one major financial system function is the facilitation of financial resources across space and time (Levine, 1997). For example, Abiad, Oomes, and Ueda (2008) provided evidence that financial liberalisation improves capital allocation efficiency.

A well-functioning financial system can reduce market friction and improve capital allocation efficiency by reducing information and transaction costs and facilitating investment opportunities (Levine, 1997). A well-established financial sector can induce the allocation of capital inflows into the most productive sectors and circumvent allocation to domestic consumption, which is not conducive to improving the productive capacity of the capital-receiving countries. In this respect, the financial system may facilitate the efficient use of capital inflows and thus reduces upward pressure on the real exchange rate. As argued by Saborowski (2009), financial sector development is valuable in mitigating FDI's appreciation effects. When capital flows are used to finance consumption rather than investment, appreciation of the real exchange rate is most probable (Calvo, Leiderman, & Reinhart, 1994). Based on recent evidence, portfolio inflows have a larger impact on the real exchange rate in emerging market economies than in high-income developed economies (Ouedraogo, 2017). This result may be attributable to the fact that the banking and financial systems in EMEs are less sophisticated than in advanced economies. Thus, the real exchange rate appreciation effects of capital flows may be attenuated by promoting the development of the financial system of the capital-recipient economy. However, study of the role of financial development in absorbing the real exchange rate appreciation effect has been relatively ignored.

Exchange rate flexibility is viewed as an essential macroeconomic tool to respond to economic impacts emanating from capital flows (Klein & Shambaugh, 2015; Obstfeld, 2015). Exchange rate flexibility may be able to discourage short-term capital inflows that are speculative and protect the financial system from exposure to vulnerability (Calvo et al., 1996; Combes et al., 2012; López-Mejía, 1999). Combes et al. (2012) deployed a panel cointegration method to analyse a group of 42 developing nations between 1980 and 2006. They suggested that exchange rate flexibility can help reduce the real exchange appreciation effect caused by capital inflows and the result is strongly significant for low-income developing economies.

2.6.3 Concluding remarks

The capital flows-real exchange rate nexus remains a debatable issue in international macroeconomic research and policy analysis. It is even more important for EMDEs that face volatile and growing international capital flows. Theoretically, capital flows can generate an appreciation impact on the real exchange rate irrespective of exchange rate regimes (Erten & Ocampo, 2017; Jongwanich & Kohpaiboon, 2013). For the floating exchange rate regime, the appreciation impact is shown in upward pressure on the nominal exchange rate whereas, in the fixed exchange rate regime, the real appreciation effect is embedded in the inflation rate. The real appreciation impact is a combination of the two aspects for intermediate regimes including managed floating or crawling peg systems.

The literature review revealed several critical features. First, the capital flows' impacts on the real exchange rate are mixed or sometimes conflicting. Whereas some studies (Combes et al., 2012; Elbadawi & Soto, 1994; Jongwanich, 2010; Jongwanich & Kohpaiboon, 2013; Lartey, 2007) claim that a capital flow surge contributes to real exchange rate appreciation, few studies are able to provide convincing evidence or, at worst, contradictory evidence (Athukorala & Rajapatirana, 2003; Bakardzhieva et al., 2010). Second, empirical analyses at disaggregated levels of capital flows provide diverging results even though a relatively general feature is that portfolio investments cause a larger real appreciation effect than other capital flow forms. The mixed results are for several reasons such as different sample countries and regions, study periods, econometric techniques, and/or variable measurements. Third, the failure to consider other important economic fundamentals such as financial development and exchange rate regime could be another reason to explain the diverging results. Analysis of the impacts of capital flows on the real exchange rate at disaggregated levels is marginal. There is no single study that systematically investigates the real exchange rate effects of capital flows from the aggregated to the most disaggregated level. Therefore, this topic warrants additional examination to enrich our understanding of capital flows' impacts on the real exchange rate and thus identify ways to mitigate risks and promote sustainable economic growth and development in EMDEs.

Chapter 3

Research Methodology

"It is better to be vaguely right than exactly wrong."

Carveth Read (16 March 1848 – 06 December 1931), Philosopher and Logician

3.1 Introduction

This chapter presents the research data and methodology. Section 3.2 explains the study sample, data collection and data sources. Section 3.3. presents the model specification, estimation methods, and the measures of the variables used in the empirical analyses for the capital inflows-economic growth nexus. Sections 3.4 and 3.5 present the model specification, estimation methods, and the measures of the variables used in the analyses of the relationships between capital inflows and domestic credit growth and between capital inflows and real exchange rate, respectively. Section 3.6 discusses the measures of the capital inflow variables (independent variables of interest) as well as the measures of the financial development and institutional quality variables that are key absorptive capacity of the capital-recipient economy used in the analysis. Section 3.7 summarises the variables used in the three main empirical models and is followed by the conclusion of the chapter in section 3.8.

3.2 Sample and Data

3.2.1 Sample

The core focus of this study is EMDEs from 1991-2015. As an official definition of EMEs is unavailable, this study follows Jacome, Sedik, and Ziegenbein (2018) and IMF (2016) in selecting a sample of EMEs and DEs. The study sample includes 130 EMDEs, comprising 31 EMEs and 99 DEs and encompassing all regions of the world and thereby making it a most comprehensive study. According to the IMF's country classification convention, the sample includes economies from six global regions: Commonwealth of Independent States (CIS), Emerging and Developing Asia (EDA), Emerging and Developing Europe (EDE), Latin America and the Caribbean (LAC), Middle East and North Africa (MENA), and Sub-Saharan Africa (SSA). Table A.1 presents the list of sample economies classified into EME and DE groups (see Appendix A).

The selection of the sample countries and study period is dictated by the availability of data that are essential for the empirical analysis. Data for some EMDEs are not available for various reasons such as civil wars (e.g., Syria). However, the sample of 130 economies is large enough to estimate our empirical models sufficiently. Moreover, the dataset allows a more granular analysis. As discussed in the literature review, the composition of capital flows matters for analysing the impacts of capital flows on macro-financial variables. Hence, this study analyses capital inflows' impacts on economic growth, domestic credit growth and the real exchange rate by disaggregating capital inflows into FDI and non-FDI, which is further decomposed into portfolio equity, portfolio debt, and other investment. It is worth noting that the non-FDI inflows are more volatile than the FDI inflows, thereby exerting impacts on economic growth, domestic credit growth, and real exchange rate differently.

3.2.2 Sample period from the 1990s

This study period begins in the 1990s for several reasons. First, global capital markets and cross-border capital flows have gained momentous importance since then (Gerko & Rey, 2017). Even though many capital account restrictions moderately remain, capital movements across borders are now largely free. Many capital account restrictions were removed in the 1990s after Lucas (1990) wrote a seminal paper on why capital did not move across the borders from developed to developing nations. Since the 1990s, capital account liberalisation has progressively taken place in many countries across different income groups (Reinhardt, Ricci, & Tressel, 2013). By the 2000s, capital could move nearly freely across borders among developed countries. Although capital account restrictions remain, the liberalisation of the capital account in lower-income countries (i.e., EMDEs) began in the 1990s (Reinhardt et al., 2013). Second, many countries undertook remarkable reforms in their economic systems from a social or planned to a market-oriented economic system. For example, many countries in Eastern Europe transitioned from a plan-based economic regime to a market-based one in the 1990s. Third, data are not available for most sample economies before the 1990s. Since this study focuses on developing countries, there are sufficient data available between 1991 and 2015 for empirical analysis. However, there are some missing data during the study period for many economies so the dataset is an unbalanced panel.

For the capital inflows-economic growth and capital inflows-domestic credit growth nexuses, this study follows standard practice and uses non-overlapping five-year averages of the underlying data from 1991-2015. This approach smooths short-run fluctuations or business cycles since the focus is on medium- and long-term persistence of economic growth (Chinn & Prasad, 2003; Kose et al., 2011; Reinhardt et al., 2013) and domestic credit growth (Lane & McQuade, 2014; Samarina & Bezemer, 2016). Hence, given the sample of 130 EMDEs from 1991-2015, there are sufficient observations for empirical analysis. For the capital inflows-real exchange rate nexus, this study follows previous studies (Combes et al., 2012; Jongwanich & Kohpaiboon, 2013) and uses annual data to estimate the proposed model discussed in section 3.5.

3.2.3 Data sources

The panel dataset of 130 EMDEs from 1991-2015 are collected from many sources. Capital flow data are from the IMF Balance of Payments (BOP) database. Real per capita GDP data are from the United Nations Conference on Trade and Development (UNCTAD) database. The real effective exchange rate data are from the Bruegel database. The World Bank World Development Indicators (WDI) database is the source of the following data: GDP, gross fixed capital formation, gross enrolment rate of secondary education, gross enrolment rate of tertiary education, total population, domestic credit to private sector, domestic credit issued by banks to private sector, broad money, trade, nominal exchange rate, consumer price index, gross saving, total reserve minus gold, and net official development assistance. The IMF World Economic Outlook (WEO) database is the data source for the inflation rate, government consumption, terms of trade, and general government gross debt. The IMF International Financial Statistics (IFS) is the source of deposit and lending interest rates. The latest version of Ilzetzki, Reinhart, and Rogoff's (2017) classification is used for the exchange rate regime data. The Chinn and Ito (2008) index updated in 2017 is employed as the financial openness index. The World Bank World Governance Index (WGI) database is the source of the corruption control index.

3.3 Capital Inflows–Economic Growth Nexus: Econometric Methods

3.3.1 Model specification

This section presents the empirical framework to analyse the capital inflow-economic growth nexus in EMDEs. To decide on the empirical determinants of the capital inflow-augmented growth model, the Solow neoclassical growth model assuming the following Cobb-Douglas production function serves as the basic point of reference.

$$Y = AK^{\alpha}L^{(1-\alpha)} \tag{3.1}$$

where Y denotes the per capita GDP, A denotes technological advancement, K denotes the capital stock, and L denotes the labour force. As argued by Lee and Barro (2001) and Barro (2003), human capital has a crucial role in driving economic growth; thus, it should be incorporated into cross-country growth regression analysis. In this respect, according to Barro (2003), the growth rate of an economy at time ***t*** is given by the following function.

$$\Delta Y = f(\mathrm{K}, \mathrm{L}, \mathrm{H}, \mathrm{O}) \tag{3.2}$$

where ΔY represents the growth rate of the per capita GDP, K represents the capital stock, L represents the labour force, H represents the human capital, and O represents the other variables including policy, institution, and country characteristics (Barro, 2003).

Based on the above theoretical model (equation 3.2), capital inflow, which is the important variable of interest in this study, is augmented into the cross-country growth regression model (equation 3.3). Capital stock, labour force and human capital, which are proxied by gross fixed capital formation, total population, and secondary education, respectively, serve as the control variables in the model. Based on the literature (Barajas, Chami, & Seyed Reza, 2016; Islam, 2016; Kose et al., 2011; Park & Claveria, 2018), these control variables are the fundamental determinants of economic growth that are commonly included in cross-country growth analysis. The initial-period per capita GDP is another important variable that is generally included as a fundamental control variable (Barajas et al., 2016; Islam, 2016; Kyaw & Macdonald, 2009; Park & Claveria, 2018). The initial-period per capita GDP is essential in capturing the convergence of economic development among the economies included in the analysis.

Previous empirical works show the dynamics of economic growth; the current growth performance is engendered by past performance. Kose et al. (2011) argue that previous studies on cross-country economic growth analysis suffer from omitted variables, which may be because of the failure to address the dynamics of economic growth. Economic growth analysis should be modelled using a dynamic approach. To capture the dynamic process of economic growth, this study includes the first lag of economic growth as an independent variable in the empirical model. The baseline empirical representation of the capital inflows-economic growth link is given by a dynamic panel data model as follows:

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta CIF_{i,t} + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \tag{3.3}$$

(for i=1, 2, 3, …, N, and t=1, 2, 3, …, T)

where the subscripts i and t are indices for country and period, respectively; $GDPG$ denotes the economic growth rate constructed as the logarithmic difference in real per capita GDP; CIF refers to capital inflow variables that are gross capital inflow and the different components of capital inflows. These capital inflow variables are measured as the ratio of the financial inflows to GDP. X refers to a matrix of fundamental control variables comprising gross fixed capital formation, labour force, human capital, and the initial-period per capita GDP. ε_t is the time-fixed effect. And u_{it} is the disturbance term comprising the unobserved country-fixed effect, μ_i, and the innovation, v_{it}, which is assumed to be independent and identically distributed with mean of zero and variance σ_v^2.

3.3.2 Estimation method: System GMM

In the proposed econometric model (equation 3.3), endogeneity issues may occur in two ways. First, simultaneity may exist in the model if $E(u_{it} \mid \mathrm{CIF}_{it}, \mathrm{X}_{jit}) \neq 0$. From an economic perspective, a simultaneity problem may arise in the capital inflows-economic growth link. The growth performance of an economy relies on the capital resources in the economy, which are a function of capital inflows, but the level of capital inflows into the economy may also be determined by economic growth. An economy with poor growth performance is not attractive to foreign investors; this eventually results in less capital inflows. As such, capital inflows and economic growth are simultaneously defined. Econometrically, in an attempt to estimate this dynamic model, the OLS and FE methods deliver biased, inconsistent coefficient estimates (Baltagi, 2013; Baltagi, Demetriades, & Law, 2009; Gujarati & Porter, 2009). This simultaneity problem can be resolved by estimating a system of two equations, including the capital inflows' impacts on economic growth and the economic growth's impacts on capital inflows. However, the system estimation requires strictly exogenous instrumental variables outside the model, which are scarcely available and justifiable in empirical economics (Roodman, 2009b; Wintoki, Linck, & Netter, 2012).

Second, unobservable heterogeneity causes an endogeneity problem if there is the presence of factors unobservable to researchers that influence both the dependent and explanatory variables (Wintoki et al., 2012). In the proposed model (equation 3.3), unobservable heterogeneity exists. The presence of the lagged dependent variable (i.e., lagged economic growth) in the model as an explanatory variable indicates there is a correlation between the right-hand side variables and the error term u_{it} because lagged economic growth, $GDPG_{i,t-1}$, contains $u_{i,t-1}$, which is partly determined by the country-fixed effect μ_i. Due to this correlation, if the model is estimated by OLS or FE methods, the estimation would yield biased, inconsistent estimates (Roodman, 2009a). The correlation between a regressor that is the lagged economic growth and the disturbance violates one of the important assumptions that ensures the consistency of the OLS estimator.

Although the country-fixed effect can be removed by using the FE or least squares dummy variable (LSDV) methods, the endogeneity problem remains because the lagged economic growth, $GDPG_{i,t-1}$, is correlated with the disturbance. The FE or LSDV estimators use the within transformation to eliminate the fixed effect or to uncover the country-fixed effect from the disturbance term, but they cannot remove the bias which is often called the dynamic panel bias or Nickell (1981) bias of order $1/T$ (Baltagi, 2013; Roodman, 2009a). Additionally, the bias does not disappear when the number of cross-sectional units is large $N \to \infty$ (Baltagi, 2013). To illustrate the process, the within transformation removes the country-fixed effect by transforming the model (equation 3.3) into a first-differenced equation as follows:

$$\Delta GDPG_{it} = \alpha \Delta GDPG_{i,t-1} + \beta \Delta CIF_{i,t} + \sum_{j=1}^{n} \delta_j \Delta X_{jit} + \Delta \varepsilon_t + \Delta v_{it} \tag{3.4}$$

The transformed model (equation 3.4), however, is still subject to the correlation between the lagged difference in economic growth, $\Delta GDPG_{i,t-1}$, and the disturbance Δv_{it} because, by construction, $\Delta GDPG_{i,t-1}$ is correlated with $v_{i,t-1}$ in the differenced disturbance term Δv_{it}. Therefore, the model should be estimated using an alternative estimator that can mitigate the endogeneity problem and deliver consistent estimates.

This study adopts a generalised method of moments (GMM) panel estimator that can address the endogeneity issues due to simultaneity and unobservable heterogeneity and provide consistent, unbiased estimates given the assumption that there is unobservable, but time-invariant, heterogeneity (Wintoki et al., 2012). The GMM estimator, developed by Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991), removes the country-fixed effect, the source of potential bias, by first-differencing variables in the model. However, the level variables employed as instruments for the first-differenced equation are perhaps weak instruments, especially when a variable series is close to non-stationarity (Arellano & Bover, 1995). Blundell and Bond (1998) improved this estimator by making an extra assumption that the first differences are uncorrelated with the fixed effects and can be used as instruments for the level equation. This mechanism more efficiently produces consistent estimates. As a result, the estimator, often called the system GMM (SGMM) or Blundell and Bond estimator, involves jointly estimating a system of the level and first-differenced equations for a dynamic panel data model by employing the lagged differences and the lagged levels as instruments for the level equation and the first-differenced equation, respectively. Therefore, to control for the endogeneity, this study employs the SGMM estimator to estimate the proposed dynamic panel data model (equation 3.3).

3.3.3 Measures of the variables

This section discusses the variables and their measurements used in the empirical model to examine the capital inflows-economic growth nexus. Table B.1 provides the definitions of the variables used in the analysis (see Appendix B).

3.3.3.1 Dependent variable: Economic growth

Economic growth is a useful economic tool to measure the progress of economic development or people's living standards in a country. Increased economic growth indicates economic output expansion and, eventually, the improvement of people's incomes or living conditions. In practice, (real) economic growth is defined as the growth rate of real per capita GDP or the growth rate of the real GDP of an economic territory derived from the national income accounting framework (Perkins et al., 2013). Theoretically, there should be no significant difference between the two measures. The real per capita GDP is simply the outcome of the real GDP divided by the total population of the economic territory. Thus, the application of one or other of the two measures should not yield any difference in the empirical results.

The growth rate of the real per capita GDP based on purchasing power parity (PPP) is another measure of economic growth that is also used in the empirical analysis (Park & Claveria, 2018). The PPP-based per capita GDP is simply the conversion of real per capita GDP of each national economy to the same measurement in US dollars by taking into account the purchasing power of the same dollar income given different price levels in the different national economy. The PPP-based per capita GDP is used to facilitate the comparison of the purchasing power between countries or economic territories.

Though some studies use the real GDP growth rate derived from the national income accounting framework (Al Nasser, 2010; Barajas et al., 2016; Kyaw & Macdonald, 2009), other studies use the PPP-based GDP growth rate (Park & Claveria, 2018). To measure economic growth, this study uses the real GDP growth rate that is constructed as the logarithmic difference of the real per capita GDP data from the UNCTAD database. Mathematically, the GDP growth rate (GDPG) is calculated as follows:

$$GDPG_t = [\ln(GDPPC_t) - \ln(GDPPC_{t-1})]*100 \tag{3.5}$$

where $GDPG_t$ is the GDP growth rate in year t, $GDPPC_t$ is the real GDP per capita in year t and $GDPPC_{t-1}$ is the real GDP per capita in the previous year.

3.3.3.2 Measures of other explanatory variables

a) Gross fixed capital formation

This study uses the gross fixed capital formation as a proportion of GDP (GFCF) gathered from the WDI database, to account for the capital stock employed as a major control variable in the capital inflows-economic growth model. As stipulated in the Solow neoclassical growth model, capital stock plays an essential role in predicting the growth of economic outputs. GFCF is expected to make a positive contribution to economic growth; the higher the GFCF, the higher the economic growth.

b) Labour force

To proxy for the labour force, this study uses the total population. A population increase causes a labour force expansion, which would lead to improved economic growth (Todaro & Smith, 2015). Many studies employ population growth as a control variable in growth regression analysis (Al Nasser, 2010; Kyaw & Macdonald, 2009). However, the debate on the effects of population growth on GDP growth rate remains unresolved. Though some studies claimed positive effects of population growth on the growth performance (Borja, 2017; Kyaw & Macdonald, 2009), others revealed negative effects (Ahmed, 2016; Al Nasser, 2010). To circumvent this controversial argument, this study uses the total population to proxy for the labour force. As the total population represents the labour force in the economy, it is anticipated to have a positive effect on economic growth according to the Solow neoclassical growth model. Hence, the larger the labour force, the more outputs the economy can produce.

More importantly, the total population is a common measure for cross-country growth regression analysis, especially for large sample analysis as in this study (130 countries). It is worth noting that the labour force data are not as widely available as the total population. The total population data are collected from the WDI database. Natural logarithm transformation is applied to the population data to reduce its skewness and to facilitate the interpretation of the results.

c) Human capital

According to Lee and Barro (2001) and Barro (2003), human capital is another fundamental determinant of economic growth. Human capital refers to the knowledge and skill sets of the labour force in the economy. However, a direct measure of human capital is barely available, especially for a long time series. In the literature, the human capital variable is proxied by educational or health attainment measures such as secondary school enrolment rates, tertiary enrolment rates or life expectancy (Borja, 2017; Kyaw & Macdonald, 2009).

At a given level of per capita GDP, higher human capital forecasts higher rates of economic growth (Barro, 2003). A country that has a higher level of human capital is predicted to grow faster than a country with a lower human capital level. The human capital variable is predicted to affect economic growth positively. Following previous work (Borja, 2017; Kyaw & Macdonald, 2009; Park & Claveria, 2018), this study uses the gross enrolment rate of secondary school education from the WDI database to measure the human capital variable.

d) The initial-period per capita GDP

In considering the development stage in the cross-country growth regression analysis, this study includes the initial-period per capita GDP in the analysis. There is a theoretical argument that an economy at a low level of economic development is likely to achieve a faster growth rate than an economy at a higher level (Borja, 2017; Kose et al., 2011). This is popularly known in the literature as convergence or "catching-up." Thus, the initial-period per capita GDP is anticipated to be negative in the growth regression results.

Because this study uses non-overlapping five-year averages of the underlying data, the initial-period per capita GDP is the per capita GDP in the year at the beginning of each period. For instance, the per capita GDP in 1991 is the initial-period per capita GDP for the period 1991-1995. The natural logarithm is applied to the initial-period per capita GDP to reduce the skewness of this variable and to better derive the economic meaning of the results. The per capita GDP is the real per capita GDP after adjustment for inflation from the UNCTAD database.

3.4 Capital Inflows–Domestic Credit Growth Nexus: Econometric Methods

3.4.1 Model specification

This section presents the empirical model used to examine the capital inflow impacts on domestic credit growth in EMDEs. Domestic credit growth could potentially be persistent (Furceri, Guichard, & Rusticelli, 2012; Igan & Pinheiro, 2011). This means the current performance of domestic credit growth is influenced by past performance. This dynamic process implies that domestic credit growth should be modelled using a dynamic approach. The relationship between capital inflows and domestic credit growth also tends to be dynamic. Current capital inflows may affect current domestic credit growth but current capital inflows could also be determined by the past performance of domestic credit growth. Hence, to characterise this dynamic relationship, a dynamic panel data model is used for the analysis. Following the prior work (Antoshin et al., 2017; Fendoğlu, 2017), the baseline specification is provided by an autoregressive distributed lag model as follows:

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda CIF_{it} + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \qquad (3.6)$$

(for *i*=1, 2, 3, …, N, and *t*=1, 2, 3, …, T)

where the subscripts i and t are indices for country and period, respectively. DCG denotes the growth rate of credit issued to the private sector over the GDP. CIF refers to the matrix of capital inflow variables. Depending on the capital inflow specifications, the matrix consists of the following variables: (1) gross capital inflows, (2) FDI and non-FDI inflows, and (3) FDI, PFE, PFD, and OI inflows. Y denotes a matrix of control variables including financial development, broad money, trade openness, exchange rate regime, the initial-period per capita GDP, GDP growth rate, inflation rate, and the change in the nominal exchange rate. These control variables are included based on the direction of the literature (they are discussed in detail in the next section). ε_t is the time-fixed effect. Finally, ξ_{it} is the error term, which consists of the unobserved country-fixed effect μ_i and the innovation ι_{it} which is assumed to be independent and identically distributed with mean of zero and variance σ_ι^2.

3.4.2 Estimation method: System GMM

The proposed econometric model (equation 3.6) may suffer from endogeneity issues due to simultaneity or unobservable heterogeneity. Simultaneity may exist in the model if $E(\xi_{it} \mid \mathrm{CIF}_{it}, Y_{jit}) \neq 0$. From an economic viewpoint, simultaneity may arise in the relationship between capital inflows and domestic credit growth. The performance of domestic credit growth in an economy depends on the funding available in the economy, which is determined by capital inflows. However, capital inflows into the economy may also be determined by the performance of domestic credit growth in the economy. A slow-growing economy, for example, tends to have a poor performance in domestic credit growth, which may not be attractive to foreign investors; this eventually results in less capital inflows. As such, capital inflows and domestic credit growth are simultaneously defined. If the dynamic model is estimated by OLS and FE estimators, the estimation will produce biased, inconsistent coefficients (Baltagi, 2013; Baltagi et al., 2009; Gujarati & Porter, 2009). One way to resolve this simultaneity problem is by estimating a system of equations (i.e., an equation of capital inflow effects on domestic credit growth and an equation of the impacts of domestic credit growth on capital inflows). The system estimation entails strictly exogenous instrumental variables outside the model, which are barely available and justifiable in empirical economics (Roodman, 2009b; Wintoki et al., 2012).

Second, in the proposed dynamic model (equation 3.6), unobservable heterogeneity exists because of the presence of the unobserved country-fixed effect, μ_i, which affects both the dependent variable (i.e., domestic credit growth) and the independent variables. The presence of the lagged domestic credit growth in the model as an explanatory variable indicates there is a correlation between the independent variables and the error term, ξ_{it}, since the lagged domestic credit growth, $DCG_{i,t-1}$, relies on $\xi_{i,t-1}$, which is partly determined by the country-fixed effect, μ_i. Because of this correlation, the estimation will result in biased, inconsistent coefficients if the model is estimated by OLS or FE estimators (Baltagi, 2013; Roodman, 2009a). The correlation between a right-hand side variable (i.e., lagged domestic credit growth) and the disturbance violates one of the fundamental assumptions required to make the OLS estimator consistent.

Even though the panel within estimators such as the FE or LSDV methods can remove the country-fixed effect, the endogeneity problem remains because the lagged domestic credit growth $DCG_{i,t-1}$ is unorthogonal with the disturbance. The FE or LSDV estimators use the within transformation to wipe out the fixed effect or to uncover the country-fixed effect from the disturbance term, but they cannot remove the dynamic panel bias (Baltagi, 2013; Roodman, 2009a). As a demonstration, the within transformation eliminates the country-fixed effect by converting the model (equation 3.6) into a first-differenced model as follows:

$$\Delta DCG_{it} = \varphi \Delta DCG_{i,t-1} + \lambda \Delta CIF_{it} + \sum_{j=1}^{n} \gamma_j \Delta Y_{jit} + \Delta \varepsilon_t + \Delta \iota_{it} \quad (3.7)$$

The first-differenced model (equation 3.7) is still subject to correlation between the lagged difference in domestic credit growth $\Delta DCG_{i,t-1}$ and the disturbance $\Delta \iota_{it}$ because, by construction, $\Delta DCG_{i,t-1}$ is related to $\iota_{i,t-1}$ in the differenced disturbance term $\Delta \iota_{it}$. More importantly, the dynamic panel bias can contaminate the coefficient estimates of the independent variables (Fendoğlu, 2017).

Instrumental variable approaches that can deal with the endogeneity problem are warranted to estimate the proposed model. The Arellano and Bond (1991) GMM estimator removes the country-fixed effect, the source of potential bias, by first-differencing variables in the model. The first-differenced model can be estimated using the level variables as instruments. However, these instruments are perhaps weak instruments, especially when the variable series is close to the unit root (Arellano & Bover, 1995). To improve this estimator, Blundell and Bond (1998) created an additional assumption that the first differences are uncorrelated with the fixed effects and can be used as instruments for the level equation. As a result, this process can efficiently produce consistent estimates. Mechanically, the Blundell and Bond estimator, widely known as the SGMM estimator, involves jointly estimating a system of the level and first-differenced equations for a dynamic panel data model by using lagged differences and lagged levels as instruments for the level equation and the first-differenced equation, respectively. This study adopts the SGMM estimator that is capable of dealing with the endogeneity in our proposed dynamic panel data model (equation 3.6).

3.4.3 Measures of the variables

This section elaborates the variables and their measurements used in the analysis of the capital inflow-domestic credit growth nexus. Table B.2 provides the definitions of the variables (see Appendix B).

3.4.3.1 Dependent variable: Domestic credit growth

Domestic credit growth is the growth of the real domestic credit provided to the private sector in an economy. Based on previous work (Boudias, 2015; Choi & Furceri, 2018), it is constructed as the logarithmic difference of the real values of credit issued to the private sector as a percentage of real GDP. Following the literature (Beck et al., 2000; Beck, Demirgüç-Kunt, & Levine, 2010; Beck & Levine, 2002, 2004), the private sector credit is deflated using the consumer price index (CPI) with 2010 as the base year. Despite limited empirical evidence in the literature, capital inflows could theoretically propel the pace of domestic credit growth in the capital-recipient economy. More importantly, it is crucial to understand to what extent capital inflows can affect domestic credit growth since it is one of this study's main questions.

3.4.3.2 Measures of other explanatory variables

a) Broad money

The broad money (BM) measure includes currency in circulation, demand and time deposits, and foreign currency deposits belonging to the residents other than central government as a share of GDP. From the macroeconomic viewpoint, it is generally expected that a rise in either banking deposits or foreign borrowings results in increased financial resources that are available for domestic credit extension (Guo & Stepanyan, 2011). Expansion of the BM supply in the economy is expected to increase disposable or lendable funds for financing domestic credit. Hence, to control for the importance of total financial resources in the economy, this study follows the prior work (Antoshin et al., 2017; Igan & Tan, 2017; Magud, Reinhart, & Vesperoni, 2014) in including the BM variable in the model. The variable is expected to affect domestic credit growth positively.

b) Trade openness

Trade openness (TO) is constructed as total imports and exports in nominal values normalised by the current GDP. The TO variable captures a country's openness towards the outside world approximated by the country's trading relations with foreign countries (Igan & Tan, 2017; Magud et al., 2014). The higher the value of TO ratio, the more the economy is integrated into the world economy. A number of studies have pointed out the growth-enhancing effect of trade openness (Dollar & Kraay, 2003; Frankel & Romer, 1999; Musila & Yiheyis, 2015). An increase in trade flows may promote economic activity or consumption that can potentially generate higher demand for domestic credit. Further, as argued by Rajan and Zingales (2003) with additional empirical support from Baltagi et al. (2009), trade openness is beneficial for fostering financial development. This phenomenon thus increases domestic credit growth. However, a country with a more open trade regime is also exposed to economic vulnerability (Kim, Lin, & Suen, 2010; Montalbano, 2011). This is particularly true for developing economies because the influx of imported goods and services may deter the development of local industries and eventually reduce domestic investment. As a result, trade openness may reduce domestic credit growth because of less demand from the private sector such as firms or households. In summary, the link between trade openness and domestic credit growth is, by and large, far from obvious.

c) Exchange rate regime

There are few measures of exchange rate regimes (ERR) in the literature. The IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) provides a major classification of global exchange rate regimes for around 200 countries. The classification is carried out and published annually by the IMF. To measure the actual implementation of the exchange rate regime, Reinhart and Rogoff (2004) introduced their measurements, improving upon the AREAER classification. This classification was subsequently updated by Ilzetzki et al. (2010, 2017). This study uses the Ilzetzki et al.'s (2017) coarse classification. The values in the coarse classification range between 1 and 6; higher values indicate more flexibility (i.e., floating) in an economy's exchange rate regime. Given an increase in capital inflows, countries adopting a more flexible exchange rate regime have less likelihood of experiencing higher domestic credit growth because the capital inflows may cause domestic currency appreciation without any other nominal effects (Boudias, 2015).

d) The initial-period per capita GDP

As discussed in section 3.3.3, the initial-period per capita GDP is the per capita GDP in the year at the beginning of each period. This sub-section does not redefine the variable. Instead, it discusses the expected connection between the initial-period per capita GDP and domestic credit growth. The initial-period per capita GDP variable controls for the impact of the development stage on domestic credit growth (Igan & Tan, 2017; Lane & McQuade, 2014; Samarina & Bezemer, 2016). An economy at a low level of initial-period per capita income is likely to experience a higher credit growth rate than an economy at a higher level, reflecting the convergence (Lane & McQuade, 2014).

e) GDP growth rate

The GDP growth rate is the logarithmic difference of the real per capita GDP as discussed in section 3.3.3.1 on the "measure of economic growth." This variable controls for the growth momentum of a nation's economic development in the analysis of the capital inflows-domestic credit growth nexus (Djankov, McLiesh, & Shleifer, 2007; Emran & Farazi, 2009). Strong economic growth demonstrates a flourishing economic performance and, thereby, high domestic credit demand. A fast-growing economy may experience faster credit growth than a slow-growing economy (Dell'Ariccia et al., 2012; Guo & Stepanyan, 2011; Igan & Tan, 2017).

f) Inflation rate

The inflation rate is constructed as the annual average change in the CPI. The inflation rate data are from the WEO database in 2017. Based on previous studies (Guo & Stepanyan, 2011; Igan & Tan, 2017; Samarina & Bezemer, 2016), inclusion of the inflation rate in the model is to control for the price impact on domestic credit growth. On one hand, the inflation rate is projected to affect domestic credit growth positively because a rising inflation rate would cause the local currency to depreciate and thus encourage further borrowings by households and firms. On the other hand, an increasing inflation rate indicates the absence of price stability that can put a brake on financial transactions (Antoshin et al., 2017). However, empirical results provide no clear-cut relationship between inflation rate and domestic credit growth. Antoshin et al. (2017) and Guo and Stepanyan (2011) found a positive link between inflation rate and domestic credit growth but Igan and Tan (2017) produced mixed findings, albeit with a generally negative relationship across regression models.

g) Change in the nominal exchange rate

Change in the nominal exchange rate (CNER) is constructed as the annual growth rate of the nominal exchange rate. The nominal exchange rate data are from the WDI database. The CNER variable controls for the impact of price adjustments on domestic credit growth (Igan & Tan, 2017). A positive CNER may increase domestic credit growth because a positive CNER means the local currency is more depreciated; thereby encourage more borrowings. However, a positive CNER may signal price instability; thus preventing banks that depends on overseas funding from increasing domestic lending. Like the inflation rate, the impact of the CNER variable on domestic credit growth is ambiguous.

3.5 Capital Inflows–Real Exchange Rate Nexus: Econometric Methods

3.5.1 Model specification

This section outlines the empirical model of the capital inflows-real exchange rate nexus. Even though the real exchange rate appears in-determinable in the short run (Meese & Rogoff, 1983), the literature agrees that it is explained by a certain number of economic factors in the medium or long run (Engel, Mark, & West, 2007; Engel & West, 2005; Ricci, Milesi-Ferretti, & Lee, 2013). The major determinants of RER are terms of trade, trade openness and productivity. Together with these major determinants, capital inflows, which are the main independent variable of interest, are augmented into the model. Based on the literature, the real exchange rate may be persistent (Combes et al., 2012; Jongwanich & Kohpaiboon, 2013). To characterise the RER dynamics, the first lagged RER is incorporated as an explanatory variable in the model. Following previous studies (Combes et al., 2012; Lartey, 2007; Saborowski, 2009), the dynamic representation between capital inflows and RER is given by:

$$RER_{it} = \eta RER_{i,t-1} + \sigma CIF_{it} + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \tag{3.8}$$

(for i=1, 2, 3, …, N, and t=1, 2, 3, …, T)

where the subscripts i and t are indices for country and year, respectively; RER denotes the real exchange rate approximated by the real effective exchange rate (REER). CIF refers to the matrix of capital inflow variables. Z denotes a matrix of control variables including terms of trade, trade openness, productivity, financial openness, exchange rate regime, government consumption, excess money supply and the change in the nominal exchange rate. ε_t denotes the time-fixed effect. Finally, the disturbance term, ζ_{it}, contains the unobserved country-fixed effect μ_i and the innovation o_{it}, assumed to be independent and identically distributed with mean of zero and variance σ_o^2.

3.5.2 Estimation method: System GMM

The dynamic panel data model (equation 3.8) may suffer from endogeneity issues because of simultaneity or unobservable heterogeneity. First, based on economic intuition, the simultaneity or reverse causality problem can occur in the capital inflows-real exchange rate nexus. As capital inflows can move the real exchange rate, the current and past performance of the real exchange rate can, in turn, influence capital inflows. Because the real exchange rate movements are determined by money supply, which is a function of capital inflows into an economy, capital inflows into an economy depends on the real exchange rate performance. As argued by Krugman (2014), capital flows are also influenced by the exchange rate because the funds are more inclined to flow into a country whose currency is viewed as undervalued than to a country whose currency is overvalued.

Second, because of the presence of the country-fixed effect, μ_i, in the model, there is unobservable heterogeneity that causes an endogeneity problem. The presence of the lagged real exchange rate as a regressor in the model indicates there is a correlation between the independent variables and the error term, ζ_{it}, because the lagged real exchange rate, $RER_{i,t-1}$, depends on $\zeta_{i,t-1}$, which is partially defined by the country-fixed effect, μ_i. Due to this correlation, the attempt to estimate the model by using OLS or FE estimators yields biased, inconsistent coefficients (Baltagi, 2013; Baltagi et al., 2009; Gujarati & Porter, 2009; Wintoki et al., 2012). Because a correlation between the right-hand side variable and the error term exists, one of the basic assumptions to ensure the consistency of the OLS estimator is violated. In the meantime, although the within estimators, such as FE or LSDV methods, can eradicate the country-fixed effect, μ_i, there remains the dynamic panel bias that does not disappear when the individual units N are large and time series T are small (Baltagi, 2013).

Given this obscure condition, the instrumental variable approach that can address the endogeneity problem is required to estimate the proposed dynamic panel data model (equation 3.8). A possible resolution is that the model can be estimated by a system of two equations, including the capital inflow impacts on the RER and the RER's impacts on capital inflows. However, the system estimation demands strictly exogenous instrumental variables outside the model, which are barely obtainable and justifiable in empirical economics.

To overcome the difficulty in finding strictly exogenous external instruments and still being able to cope with the endogeneity issues, the alternative solution is to use the GMM panel estimator that can efficiently deliver consistent coefficient estimates. Specifically, the study uses the SGMM estimator that involves jointly estimating a system of the level and first-differenced equations for the dynamic panel model using the lagged differences and the lagged levels as instruments for the level equation and the first-differenced equation, respectively. This SGMM estimator was devised by Blundell and Bond (1998) by refining the Arellano and Bond (1991) GMM estimator to improve the estimator's efficiency. The Arellano and Bond estimator eliminates the country-fixed effect, which is the source of dynamic panel bias, by first-differencing variables in the model and uses the level variables as instruments to estimate the first-differenced model. However, according to Arellano and Bover (1995), these instruments are likely weak instruments and that is especially true when the level variables are close to non-stationarity. Blundell and Bond (1998) refined the estimator by including an extra assumption that the first differences are not correlated with the fixed effects and can be used as instruments for the level equation. Thus, this system estimation mechanism is more efficient in delivering consistent estimates. This study uses the SGMM estimator to estimate the proposed model (equation 3.8) to control for endogeneity.

3.5.3 Measures of the variables

This section discusses the variables and their measurements used in the analysis of the capital inflows-real exchange rate nexus. Table B.3 provides the definitions of the variables (see Appendix B).

3.5.3.1 Dependent variable: Real exchange rate

This study follows the literature that commonly uses REER as the RER measure. REER measures a nation's currency at real value against a basket of the nation's trading partner currencies. It is constructed as the geometrically weighted mean of the nominal effective exchange rate and consumer price indices of the studied nation against its trading partners (Darvas, 2012). The REER data are from the Bruegel Database because it provides a long-time REER series for more developing countries than other databases such as IFS. An REER increase corresponds to an RER appreciation. The natural logarithm is applied to the REER data to reduce the data's skewness and to provide an easier interpretation of the results.

3.5.3.2 Measures of other explanatory variables

This section discusses the measures of the explanatory variables used in the capital inflows-real exchange rate model as well as their expected relationships. A few independent variables in the capital inflows-real exchange rate model are the same variables as used in the capital inflows-domestic credit growth model. They are: trade openness, exchange rate regime and change in the nominal exchange rate. For these three variables, this section explains the reasons why they are included in the model and the expected relationships between them and the real exchange rate.

a) Terms of trade

Terms of trade (TOT) is an important variable that affects the real exchange rate movements. TOT is measured as the average export price divided by the average import price (Parkin & Bade, 2015). An increase in this ratio is known as the TOT improvement, which is favourable for exporting economies because, for a given amount of exports, the economy can afford more imports. In this respect, a TOT improvement causes an increase in the income of exporting economies, the "income effect" in the literature, which causes a surge in domestic demand (Jongwanich & Kohpaiboon, 2013). As a result, to restore internal and external balance, the prices of non-tradable goods need to increase compared with the prices of tradable goods thereby causing RER appreciation. The income effect may, however, be offset by the "substitution effect" where the lower import prices relative to the export prices generates increased demand for tradable goods. This would result in RER depreciation. Hence, the theory provides an unclear relationship between TOT and RER. Nevertheless, according to previous studies (Baffes, O'Connell, & Elbadawi, 1999; Comunale, 2017), the literature seems to generally emphasise that a TOT improvement causes RER appreciation because the income effect dominates the substitution effect.

b) Productivity

A key determinant of RER is the "productivity or technology effect," which is known in the literature as the "Balassa-Samuelson effect." The relative prices of tradable and non-tradable goods can be altered by a productivity or technological differential between the tradable and nontradable sectors (Balassa, 1964; Samuelson, 1964). Productivity or technological improvements can propel higher productivity that, in turn, expands the availability of economic factors and thereby lessens the demand for or prices of goods in the economy, depreciating the RER (Edwards, 1989). However, productivity or technological improvements tend to take place in the tradable relative to the non-tradable sector. This phenomenon is likely to raise wages and labour demand in the tradable sector. Labour would move from the non-tradable to tradable sector under full employment condition; this labour movement places upward pressure on wages in the non-tradable sector. Hence, to reinstate the economic balance internally and externally, the RER must appreciate (Obstfeld & Rogoff, 1996). More importantly, technological development may increase the economy's income, resulting in rising demand for and prices of non-tradable goods thereby appreciating the RER. According to a number of studies (Bordo, Choudhri, Fazio, & MacDonald, 2017; Chong, Jordà, & Taylor, 2012; Imai, 2018; Lothian & Taylor, 2008), this Balassa-Samuelson effect holds.

The Balassa-Samuelson effect in the literature is generally proxied by manufacturing GDP per capita or overall GDP per capita (Combes et al., 2012; Jongwanich & Kohpaiboon, 2013; Lartey, Mandelman, & Acosta, 2012). These proxies are not the best measures (Ricci et al., 2013). Based on the hypothesis of the Balassa-Samuelson effect, equal improvement of productivity in the tradable and non-tradable sectors would increase per capita GDP but would generate no impact on RER. For empirical analyses of advanced economies where data are available (e.g., OECD countries), the direct measurement of productivity in the tradable and non-tradable sectors is used (MacDonald & Ricci, 2005, 2007). For this study, covering 130 developing countries where data on the productivity of the tradable and non-tradable sectors are extremely limited, the per capita GDP is employed as a measure of productivity in the regression analysis.

c) Government consumption

Government consumption is a key determinant of RER movements. Because the government is likely to spend more on nontradable goods, the price of non-tradable goods will rise compared with the price of tradable goods; thus, RER is expected to appreciate (Jongwanich & Kohpaiboon, 2013; Ricci et al., 2013). In contrast, a decrease in government spending results in less demand for domestic goods, thereby relieving pressure on the relative prices of tradable and non-tradable goods, ultimately relieving pressure on RER. Hence, government consumption or spending is predicted to have an inverse relationship with RER.

d) Financial openness

The financial openness (FO) variable is the Chinn and Ito (2008) financial openness index that evaluates a nation's capital account restrictiveness in terms of financial transaction rules and regulations. The latest version of the financial openness index updated in 2017 is used in this study. The index is computed using principal component analysis on the data regarding transboundary financial transactions collected from AREAER. The index is fundamentally the de jure measure of capital account openness that is most widely used in the literature to control for the extent of capital account restrictions of an economy. The latest version of the index covers 182 countries from 1970-2015 with values ranging from -1.90 to 2.37. The higher index values indicate that the economy's capital account is more open (or less restrictive). To consider the impacts of the de jure capital account openness or capital control in facilitating cross-border financial transactions that may eventually affect the real exchange rate, this study follows prior work (Combes et al., 2012) by including this financial openness variable in the analysis.

e) Excess money supply

Excess money supply (EMS) is calculated as the difference between money supply and GDP growth rates. Following Saborowski (2009), EMS is incorporated into the model to reflect the monetary stance of the capital-recipient economy. Excess money supply results in RER depreciation under a flexible exchange rate regime if the money supply growth rate is faster than that of the money demand, which is approximated by the GDP growth rate. Excess money supply fuels inflation, resulting in real exchange rate appreciation under the pegged exchange rate regime (Erten & Ocampo, 2017; Terra, 2015). In the context of capital inflows, the monetary authority in a country with a fixed exchange rate regime is obliged to intervene in the foreign exchange markets to retain the desired exchange rate. This exchange rate intervention causes foreign reserve accumulation and domestic monetary base expansion, which may fuel inflation and appreciate the RER. This effect can be attenuated by a monetary authority's "sterilisation" measures including open market operations or other monetary actions (e.g., raising the bank's reserve requirements and shifting government deposits with commercial banks).

f) Trade openness

As defined in section 3.4.3.2, TO projects to what extent an economy is open to the outside world or integrated into the global economy. To understand the impact of TO on RER movements, it is important to emphasise that trade restrictions in the form of either tariffs or quotas (e.g., import quotas) may increase the demand for and price of non-tradable goods and thus appreciate the RER (Ouedraogo, 2017). In contrast, TO may result in RER depreciation. The literature gives ambiguous evidence regarding the TO-RER relationship (Combes et al., 2012; Lartey, 2008).

g) Exchange rate regime

As discussed in section 3.4.3.2, higher values of the ERR classification indicate a country's more flexible exchange rate regime. For a country with a flexible regime, an increase in capital inflows puts less pressure on the real exchange rate relative to a country with a rigid exchange rate regime. Combes et al. (2012) contend that the appreciation effects of capital inflows can be attenuated by exchange rate flexibility. Thus, this study includes the ERR in the capital inflows-RER model to control for the role of exchange rate flexibility.

h) Change in the nominal exchange rate

The CNER variable is included in the model to capture nominal exchange rate adjustment, which is a crucial policy tool for a capital-recipient economy in responding to capital flow movements and, ultimately, to correct for exchange rate disequilibrium. This policy tool has been vital for the East Asian economies to maintain realistic exchange rate positions (Krueger, 1997). As pointed out by Caporale, Ali, Spagnolo, and Spagnolo (2017), Asian central banks have conducted extensive interventions in the foreign exchange markets in past decades to ease the impact of capital flows. A positive CNER implies depreciation of the local currency compared with foreign currencies and thus a RER depreciation. Therefore, CNER and RER are expected to move in opposite directions.

3.6 Measures of the Major Independent Variables

This section discusses the major independent variables and their measurements used in the analysis. Capital inflow variables are the major independent variables of interest in this study to investigate the impacts of capital inflows on economic growth, domestic credit growth and the real exchange rate. One research objective is to test whether the impacts of capital inflows on these three macro-financial variables are conditional on domestic absorptive capacity, particularly financial development. The key absorptive capacity variables considered are financial development and institutional quality. The financial development variable is included across the three main models but institutional quality is considered only in the capital inflows–economic growth model and the capital inflows–domestic credit growth model. This section presents the measures of the capital inflows, financial development and institutional quality variables used in the analysis.

3.6.1 Capital inflows

This study uses gross capital inflows rather than the net capital flows as they are arguably more meaningful for the analysis. The importance of gross capital flows has been unfailingly underlined in the growing literature (Araujo et al., 2015; Broner, Didier, Erce, & Schmukler, 2013; Gourinchas & Rey, 2014; Milesi-Ferretti & Tille, 2011). Gross capital flows show to what extent an economy is integrated into global capital markets (Kose et al., 2011; Lund et al., 2017). Forbes and Warnock (2012) argue that the foreign and domestic investors' decisions are motivated by diverse factors so that it would be best to analyse them separately. Furthermore, the gross capital position is superior in capturing the effects of shocks on the national economy (Obstfeld, 2012). According to Broner et al. (2013), gross capital flows are larger and more volatile than net capital flows. Also, net capital flows do not provide a complete picture of capital flow dynamics because some flows net out so are observable only in gross flows (Beckmann & Czudaj, 2017; Shin, 2012). As argued by Gopinath (2017), there were substantial increases in gross capital flows between economies leading to the 2008-2009 GFC but there were no significant net imbalances. However, the substantial increases in capital flows were the source of financial instability. One can hypothesise that gross capital inflows exert more influence on macroeconomic and financial variables than net capital flows.

Gross capital inflows are disaggregated into FDI and non-FDI inflows for the analysis. The non-FDI inflows are further disaggregated into PFE, PFD and OI inflows to provide a more detailed analysis. The different components of capital inflows may differently affect economic growth, domestic credit growth and the real exchange rate. A more granular analysis can provide more inclusive evidence regarding the importance of capital inflow composition in designing and implementing capital flow management policy or strategy. This analysis thus contributes to the literature because the impacts of capital inflow composition have been overlooked.

Gross capital inflows (GCI) are constructed as the sum of all types of financial inflows, including FDI, PFL and OI inflows as a share of GDP. Likewise, FDI inflows are constructed as the total foreign direct investment from abroad as a proportion of GDP. PFE inflows are the total portfolio equity inflows from abroad as a proportion of GDP. PFD inflows are the total portfolio debt inflows from abroad as a proportion of GDP. OI inflows are the total other investment inflows from abroad as a proportion of GDP. Non-FDI inflows (NONFDI) are the total of portfolio investments and OI inflows. Portfolio investment inflows are the total of PFE and PFD inflows.

3.6.2 Financial development

A well-developed financial system is of first-order importance in ameliorating resource mobilisation and allocation efficiently (Beck & Levine, 2002; Levine, 1997, 2005). Financial development is a meter that measures the financial system's capacity to resolve market friction, such as information and transactions costs, and intermediate financial resources into the most productive areas in the economy. In measuring financial development, a wide range of measures has been used in the literature based on quantitative and qualitative importance such as size or depth, activity or access, and efficiency. The fundamental debate on how to accurately measure financial development remains (Beck et al., 2010; Beck & Levine, 2002; Levine, 2005; Svirydzenka, 2016), but there is some consensus. The first systematic review of the financial development measures was in Beck et al. (2000) that classified the measures into two categories: bank-based and stock market-based measures.

Forg the bank-based measures, several measures have been applied in prior studies. The first measure is the liquid liability of the financial sector, which is the sum of currency in circulation and demand and time deposits in banks and non-bank financial institutions (i.e., M2 or M3). It is widely used to reflect the size of financial intermediation or liquidity in the economy because it includes all the liability components of the central bank, commercial banks and other financial institutions. As it is the broadest measure of financial development, it has some limitations. It provides the least insight in terms of the flow of financial resources, financial service quality (e.g., risk management, information processing), and the performance of financial intermediation (Levine, 2005). Moreover, the liquid liability can generally reflect the quantitative size of financial transactions in the financial sector rather than its capability to allot financial resources from savers to borrowers (Khan & Senhadji, 2003). This measure, which has been used in previous studies, is rather controversial in terms of the results and interpretation (Zingales, 2003). The liquid liability is a low-quality measure of financial development, particularly for the countries with an under-developed financial system because a high degree of liquidity in the economy or monetization may be related to poor financial development or vice versa (Ang & McKibbin, 2007; Favarra, 2003; Khan & Senhadji, 2003).

A bank-based measure that can outperform the above measure is the credit issued by banks to private sector scaled by GDP. This measure better captures the depth, activity and efficiency of financial intermediaries in the economy. A financial system that channels more financial resources (i.e., credit or loans) to the private sector is highly likely to perform more analytical work on the borrowing firms, exercise corporate management, and conduct risk management services (King & Levine, 1993). Moreover, it performs better than the other measures because it is directly linked to economic activity and investment that can potentially propel economic growth.

Regarding stock market-based measures, the market capitalisation of listed firms scaled by GDP is often applied because it captures the size of the stock market. This measure, however, does not reflect the activity and efficacy of the financial market in channelling financial funds across economic sectors. Stock market traded value as a percentage of GDP is often used because it reflects the liquidity and activity of the financial market although it cannot provide any insight into the efficiency of financial intermediation. The two measures are fundamentally the multiplication of quantity and price; hence, they are susceptible to rapid changes in the expectations of market participants (Beck & Levine, 2002; Levine & Zervos, 1998). More importantly, stock market-based measures cannot reflect the financial development level in EMDEs because banks play a major role and account for the largest share of the financial system. Based on the WDI database, only 38.5% of the total 130 sampled EMDEs have sporadically reported some data of stock market capitalization, but they are not usable for such a large cross-country analysis in this study.

Despite some limitations in representing the financial development of an economy, credit to the private sector by banks as a share of GDP is more likely to outperform the other measures. It is particularly more relevant for the EMDEs because the financial systems of these economies are bank-based. Therefore, following Guo and Stepanyan (2011), this study uses the ratio of the credit to the private sector by banks as a share of GDP as the measure of financial development variable.

3.6.3 Institutional quality

The WGI is a popular indicator employed in the literature to approximate institutional quality. The WGI does not have an overall composite index, but is composed of six indices measuring different dimensions of governance quality: voice and accountability, political stability and absence of violence, the rule of law, regulatory quality, government effectiveness, and control of corruption. The index numerically measures the quality of each governance aspect from -2.5 (weak) to 2.5 (strong). This study uses the control of corruption index for several reasons. First, this study argues that the control of corruption is relatively more relevant in evaluating the impact of institutional quality on economic growth because corruption is undoubtedly detrimental to economic activity and business performance. Corruption is commonly cited as a major stumbling block to good economic performance (Acemoglu & Robinson, 2012; Kunieda et al., 2014). Second, the empirical results can provide specific policy advice to policymakers and government practitioners with regard to the improvement in institutional quality, that is, whether corruption matters for economic growth.

Noticeably, the WGI data are available only from 1996. As this study uses non-overlapping five-year average data to estimate the capital inflows–economic growth model and the capital inflows–domestic credit growth model, the sample period for the regression analyses would drop to only four periods if the 1991-1995 period is not considered because of the unavailability of WGI data. If this is not impossible, it would dramatically reduce the statistical power in estimating the dynamic panel data models where the lagged dependent variable is one of the right-hand side variables. Hence, instead of dropping the 1991-1995 period, we impute the WGI data for the 1991-1995 period with the 1996 data because it is unlikely that the institutional quality in developing countries of our study interest has changed significantly during the period. It is generally observed that institutional changes happen sluggishly (Kose et al., 2011). Furthermore, although some other dimensions of institutions, such as legal and regulatory aspects, may change significantly in a relatively shorter timespan, corruption practices hardly make any major change. Notwithstanding changes in the formal rules, informal institutions, such as social norms and beliefs (e.g., corrupt practices), are likely to change slowly (World Bank, 2017). Therefore, this study uses the control of corruption index values in 1996 for the 1991-1995 period for the relevant sample countries.

3.7 Recap of the Variables Used in the Three Main Empirical Models

This section summarises the variables deployed in the three main empirical models as shown in Table 3.1. The dependent variables in this study are economic growth, domestic credit growth and the real exchange rate. The major independent variable of interest is capital inflows. As this study tests whether the impacts of capital inflows on economic growth, domestic credit growth and the real exchange rate are conditional on the domestic economic condition of the capital-recipient economy, the financial development and institutional quality are factored in as the key absorptive capacity. Though financial development is considered across the three main models, institutional quality is included only in the CIF-EG and CIF-DCG models.

Table 3.1 Summary of the variables used in three main empirical models

Variables	Variable Abbreviation	CIF-EG Model	CIF-DCG Model	CIF-RER Model
Dependent Variables of Interest				
GDP growth rate	GDPG	✓		
Domestic credit growth	DCG		✓	
Real exchange rate	RER			✓
Independent Variables of Interest				
Capital inflows	CIF	✓	✓	✓
Financial development	FD	✓	✓	✓
Institutional quality	IQ	✓	✓	
Control Variables				
Gross fixed capital formation	GFCF	✓		
Labour force	POP	✓		
Human capital	SE	✓		
Initial-period per capita GDP	GDPPC_INT	✓	✓	
Broad money	BM		✓	
Trade openness	TO		✓	✓
Exchange rate regime	ERR		✓	✓
GDP growth rate	GDPG		✓	
Inflation rate	IFR		✓	
Change in the nominal exchange rate	CNER		✓	✓
Terms of trade	TOT			✓
Per capita GDP	GDPPC			✓
Government consumption	GC			✓
Financial openness	FO			✓
Excess money supply	EMS			✓

Source: Author's compilation.

It is important to note that a few control variables are used in different models. The initial-period per capita GDP is used in both the CIF-EG and CIF-DCG models. Trade openness, exchange rate regime and change in the nominal exchange rate are incorporated in the CIF-DCG and CIF-RER models.

3.8 Chapter Summary

This chapter presented the sample, data, and econometric approach in answering the research objectives of this study. The selection of country sample and study period is based on the availability of data. The study sample includes 130 EMDEs from 1991-2015. There are some missing data during the study period 1991-2015; thus, the data set for this study is an unbalanced panel. A few economies do not have sufficient data for various variables (e.g., capital inflows, financial development). Hence, the number of sample economies for regression analysis dropped to between 102 and 118. Because most EMDEs have FDI data, the sample is 118 economies. Fewer EMDEs have PFE and PFD data, so the sample decreases to 102 economies. However, the sample remains over 100 economies, which still makes this study one of the largest empirical studies.

To examine the nexuses between capital inflows and economic growth, domestic credit growth, and the real exchange rate, this study adopts dynamic panel data models to characterise the dynamics of economic growth, domestic credit growth and the real exchange rate. To estimate the three empirical models, the SGMM estimator is utilised because of endogeneity issues caused by simultaneity and unobservable heterogeneity.

This study uses capital inflows rather than net capital flows to investigate the impacts of capital flows on economic growth, domestic credit growth and the real exchange rate. Recent literature underlines the importance of using gross capital flows because they show larger size and fluctuations, including reversing direction. These features would be masked if net capital flows were used because some components of capital inflows would be netted out by capital outflows. More importantly, this study focuses on EMDEs that stand to receive capital inflows from capital-exporting countries. Therefore, the impacts of capital inflows on major macro-financial variables, such as economic growth, domestic credit growth, and real exchange rate, are of more concern for EMDE policymakers.

Chapter 4

Capital Inflows and Economic Growth: Empirical Results and Discussion

"…the increasing effectiveness of financial markets in facilitating the flow of trade and direct investment, which are so patently contributing to ever higher standards of living around the world."

Alan Greenspan (1997), Former Chairman of the US Federal Reserve

4.1 Introduction

This chapter presents the empirical results of the capital inflows-economic growth nexus in EMDEs. Section 4.2 presents some basic facts of the evolution and dynamics of capital inflows, economic growth, and descriptive summaries of the other explanatory variables used in the analysis. The baseline analysis is presented in section 4.3, followed by the analytical results and discussion of the role played by financial development in gauging the link between capital inflows and economic growth in section 4.4. Section 4.5 presents the empirical results and discussion of the role played by institutional quality in evaluating the effects of capital inflows on economic growth. Section 4.6 concludes the chapter.

4.2 Basic Facts and Descriptive Statistics

This section presents some basic facts and descriptive analysis of the capital inflows-economic growth nexus in EMDEs, which are the focused group of economies in this study. With a sample of 130 EMDEs between 1991 and 2015, the section describes the patterns and trends of capital inflows, economic growth, and the potential link between the two variables. The section also discusses the descriptive summaries of the independent variables used in the analyses.

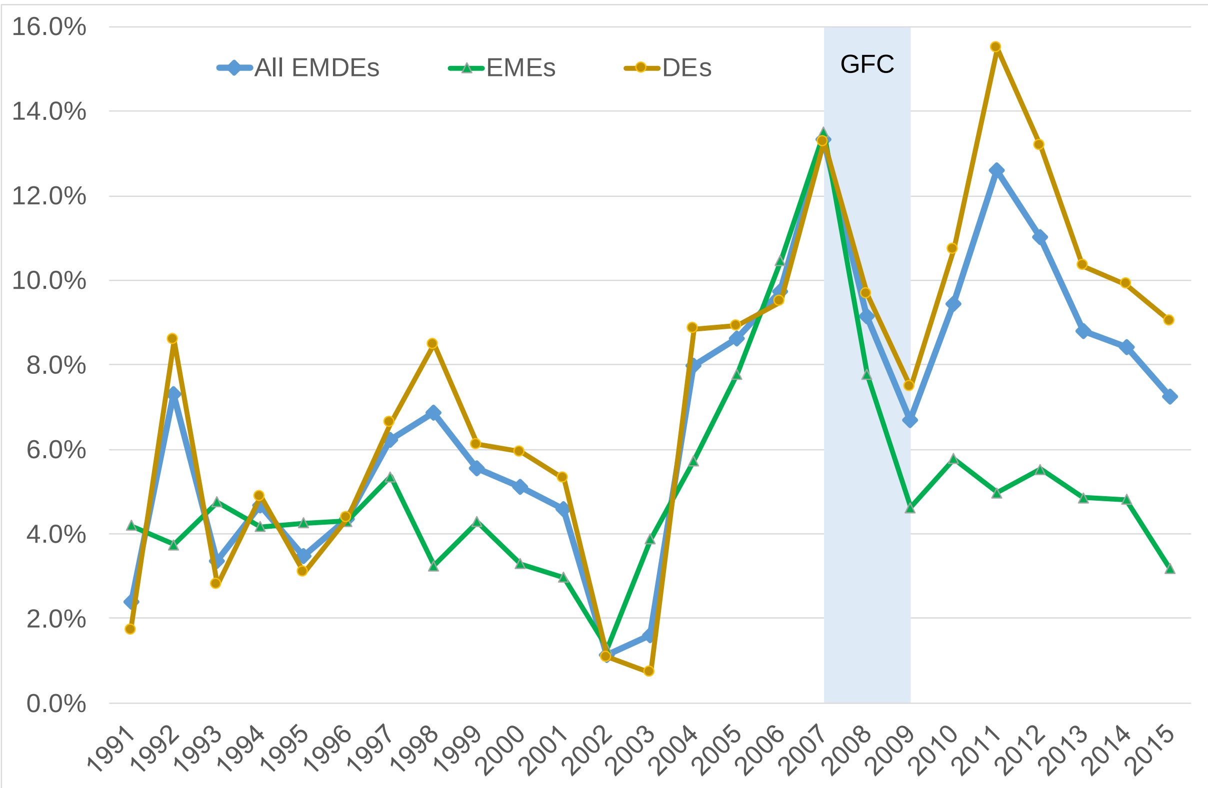
4.2.1 Basic facts

4.2.1.1 Patterns of capital inflows into EMDEs

Figure 4.1 shows the average gross capital inflows as a percentage of GDP for a sample of 130 EMDEs in this study based on data compiled from the IMF's BOP database. Since 1990, there have been three episodes of capital inflows into EMDEs. The first episode was between 1991 and 2002, during which the average capital inflows into EMDEs was 4.6% of GDP. The financial flows into EMDEs as a share of GDP started from a recorded 2.4% of GDP in 1991 to nearly 6.9% of GDP in 1998 before plummeting to a trough at around 1.1% of GDP in 2002. Drastic decline in capital inflows into EMDEs between 1998 and 2002 could be because of the panic caused by the Asian financial crisis started in late 1997, rattling many economies in the East and Southeast Asia. The second episode started in 2002 as capital inflows accelerated to the highest record level of 13.3% of GDP in 2007 before the impact of the GFC, originating in the United States, severely shocked the developing world in 2008 and 2009. Consequently, capital inflows plunged to about 6.7% of GDP in 2009, marking the end of the second episode. The third episode began with a significant resurgence of capital inflows into EMDEs that reached another peak of 12.6% of GDP in 2011, which could be because of the implementation of the quantitative easing policies across developed economies. Capital inflows into EMDEs then subsequently dropped to 7.3% of GDP in 2015. In summary, despite noticeable fluctuations, capital inflows into EMDEs have risen steadily over the past 25 years from an average of 4.9% of GDP in the 1990s to around 9.6% of GDP in the last decade.

For EMEs, the financial inflows during the study period appeared to be relatively less volatile than for the DEs. The financial inflows into 31 EMEs in the sample were about 4.2% of GDP in the 1990s before rising markedly to 6.6% of GDP in the last decade. For the 99 DEs in the sample, capital inflows doubled from 5.3% of GDP in the 1990s to 10.9% of GDP in the last decade. This substantial surge in capital inflows into DEs could be driven by the foreign investors' search for higher yields and accelerated financial liberalisation in the developing world.

Figure 4.1 Capital inflows as a share of GDP in EMDEs from 1991 to 2015



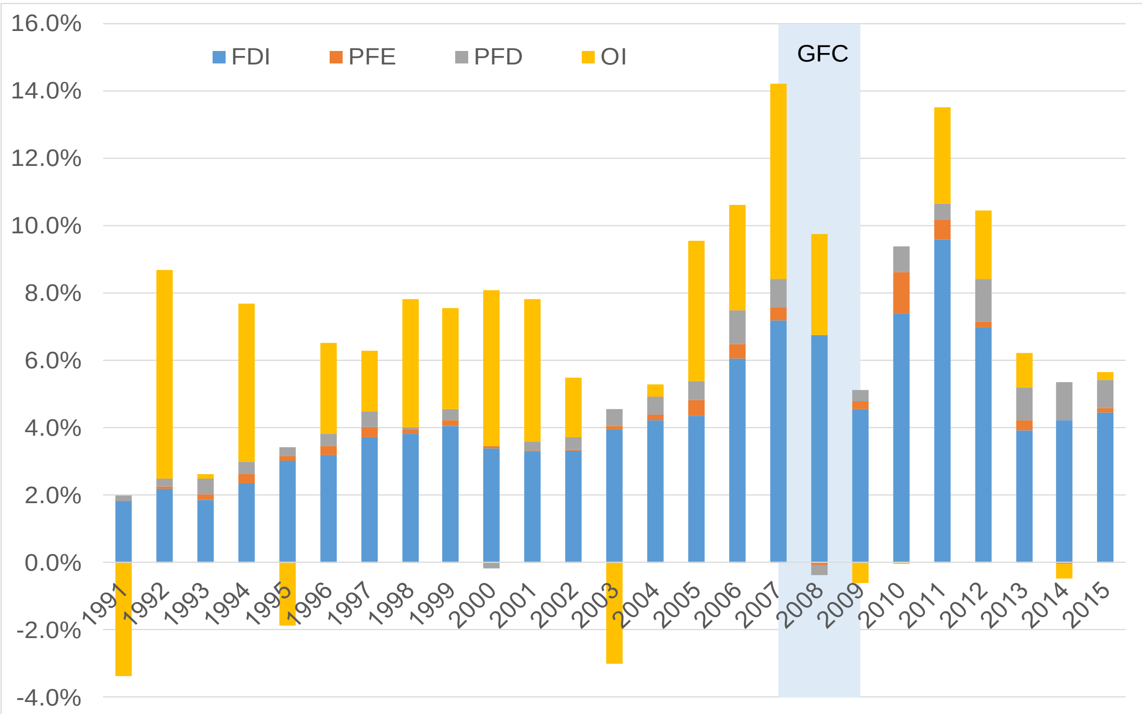
Source: Author's calculations based on data from the IMF BOP database.

Composition of capital inflows

To gain a better understanding of the evolution and dynamics of capital inflows into EMDEs, the composition of the average capital inflows as a share of GDP per annum is shown in Figure 4.2. During the past 25 years, FDI has played a crucial role in providing financial resources to EMDEs and constituted the largest share of financial inflows into the EMDEs. This is true for both EMEs and DEs as illustrated by Figures 4.3 and 4.4. Overall, FDI has steadily and gradually expanded, rising from 1.8% of GDP in 1991 to the highest recorded level of 7.2% of GDP in 2007 before declining to 6.8% and then 4.6% of GDP in 2008 and 2009, respectively, because of the GFC.

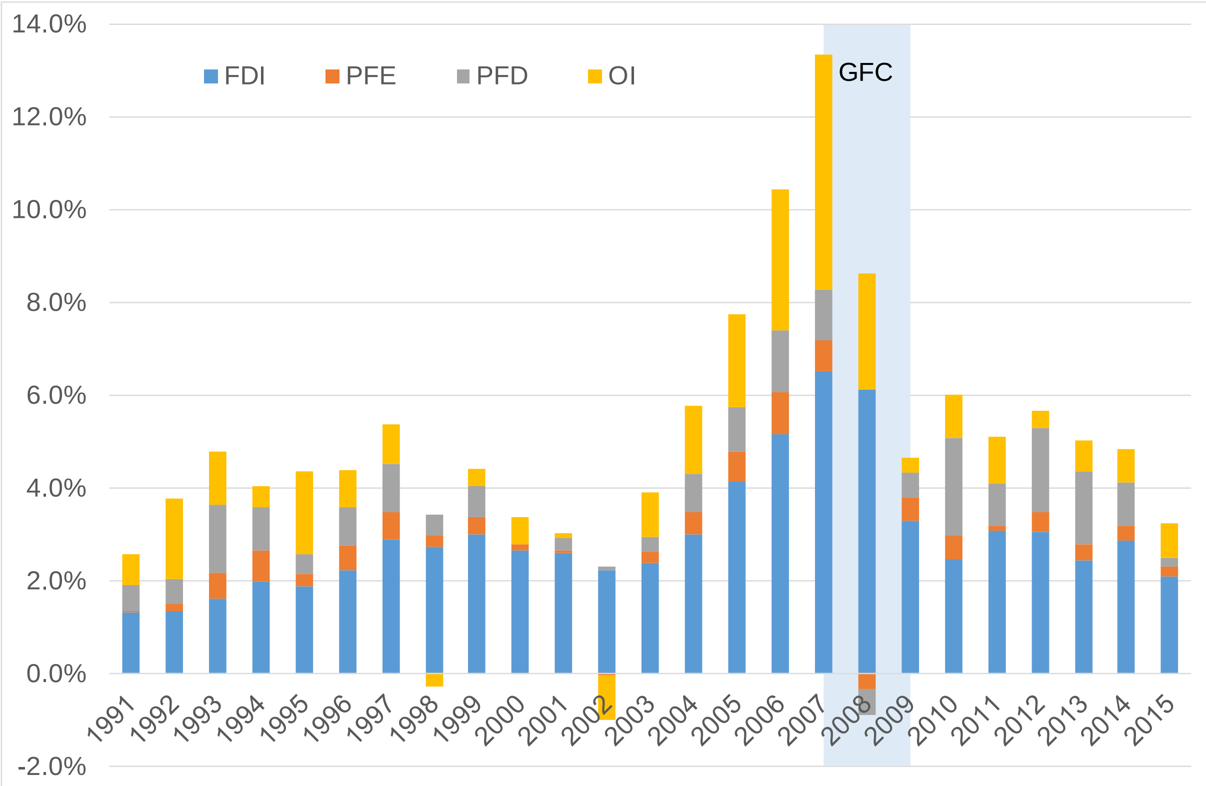
OI inflows were the second largest contributor of capital inflows into EMDEs. Although they have been the most volatile financial flows, the OI inflows into EMDEs amounted to an average of 1.8% of GDP per annum between 1991 and 2015. An interesting feature in Figure 4.2 is that the OI inflows expanded drastically in the lead-up to the GFC and contracted abruptly after it. That may reflect growing bank lending across borders before the GFC since bank lending is the OI inflows' major component. Figured 4.3 and 4.4 show that this feature was not different for the EMEs and DEs. Portfolio investments, composing PFE and PFD, accounted for the smallest share of total capital inflows into EMDEs, reflecting their less developed financial markets. PFE doubled from 0.2% of GDP in the lead-up to GFC to 0.4% of GDP after it. Meanwhile, PFD expanded from around 0.4% of GDP before the GFC to about 0.9% of GDP after it. Figures 4.3 and 4.4 show that EMEs obtained higher shares of PFE and PFD inflows than DEs because EMEs have higher financial market development levels.

Figure 4.2 Composition of capital inflows as a share of GDP in EMDEs from 1991 to 2015



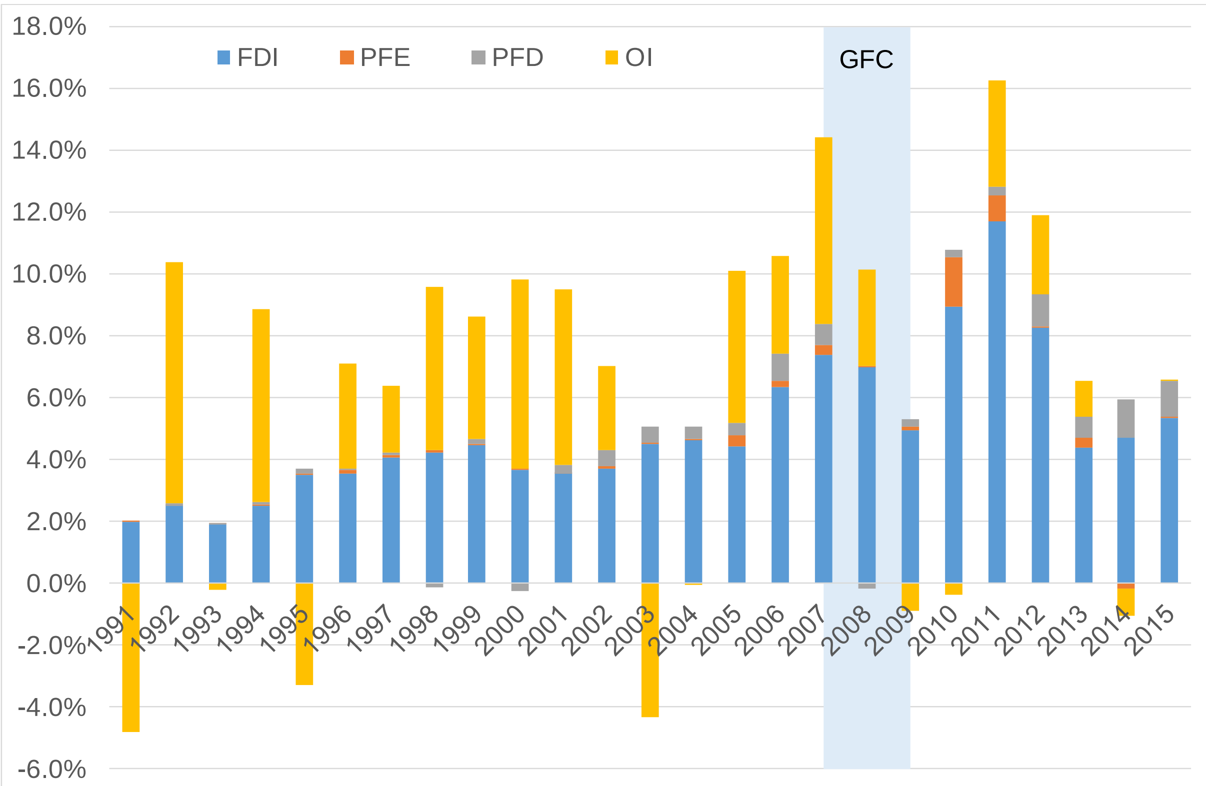
Source: Author's calculations based on data from the IMF BOP database.

Figure 4.3 Composition of capital inflows as a share of GDP in EMEs from 1991 to 2015



Source: Author's calculations based on data from the IMF BOP database.

Figure 4.4 Composition of capital inflows as a share of GDP in DEs from 1991 to 2015



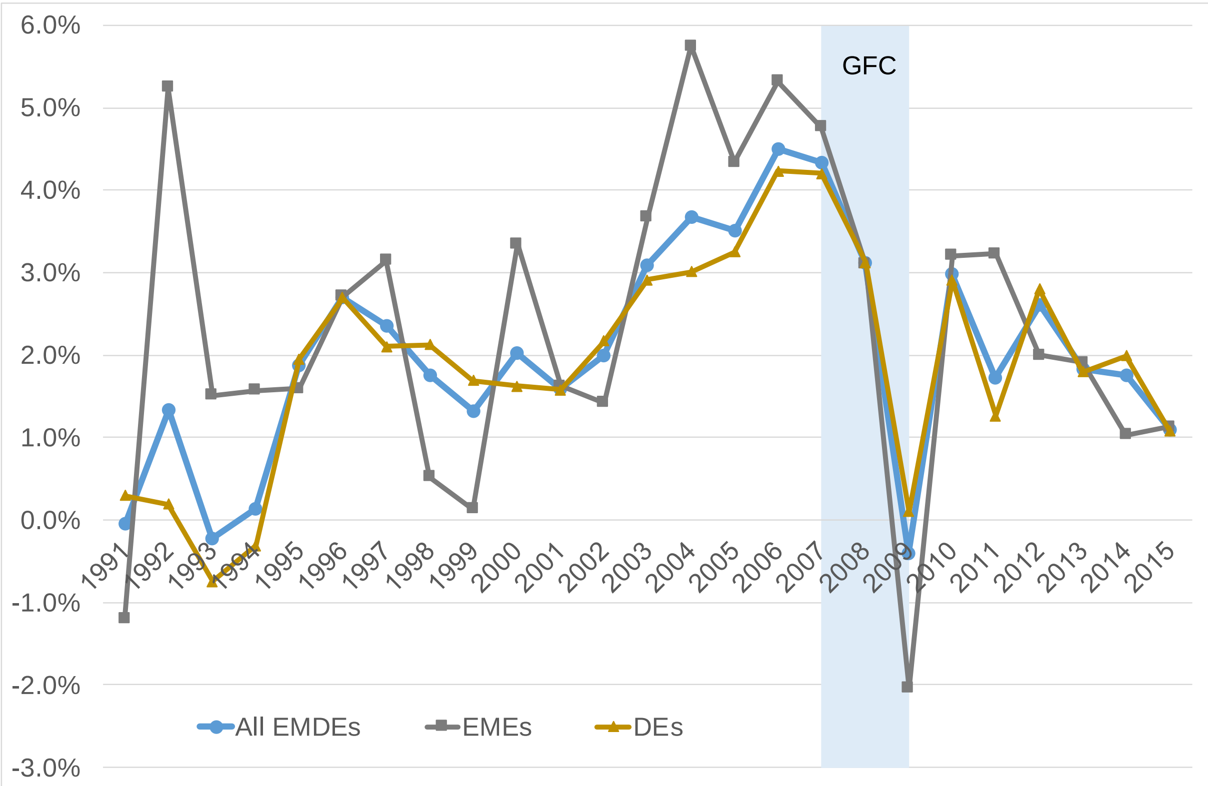
Source: Author's calculations based on data from the IMF BOP database.

4.2.1.2 Patterns of GDP growth rates in EMDEs

Figure 4.5 shows the movements and trends of GDP growth rates in EMDEs from 1991-2015. EMDEs generally experienced positive GDP growth rates over past decades, with an average of 2.0% per annum. EMDEs registered rising GDP growth rates from -0.04% in 1991 to a peak of 4.5% and 4.3% in 2006 and 2007, respectively, in the prelude to the 2008-2009 GFC. The GDP growth rates in EMDEs dropped to -0.4% in 2009, marking the deepest adverse effects of the global economic meltdown in the developing world. The economic recovery of the EMDEs began and revolved around an annual growth rate of 2.0% during 2010-2015.

Figure 4.5 also has an interesting feature. The GDP growth rates in EMEs appear to be more volatile than those of the DEs. Compared with DEs, EMEs were hardest-hit by the 2008-2009 GFC. EMEs experienced a strong economic contraction, registering a growth rate of -2.0% in 2009 whereas DEs grew at a rate of 0.1% that same year. However, both groups' economies made a swift recovery with an average growth rate of 2.0% annually between 2010 and 2015.

Figure 4.5 Real GDP growth rate in EMDEs from 1991 to 2015

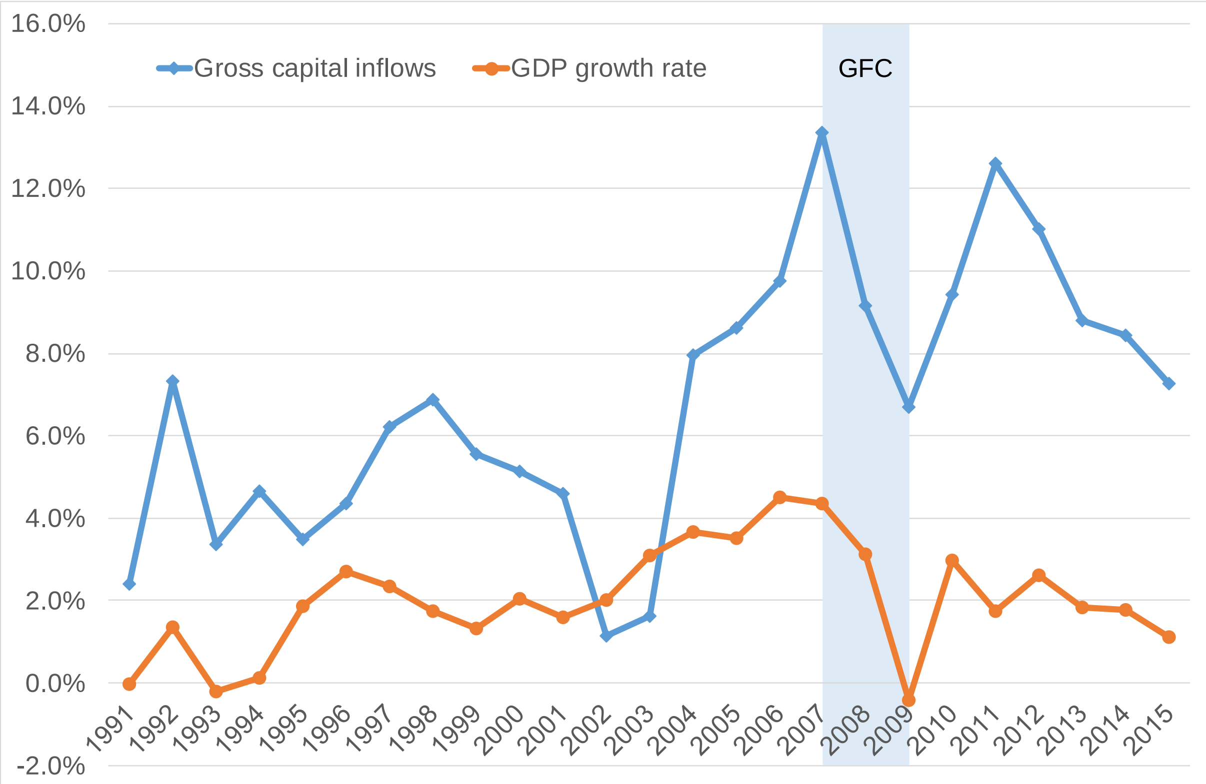


Source: Author's calculations based on data from the UNCTAD database.

4.2.1.3 Potential links between capital inflows and GDP growth rate

Figure 4.6 shows the trends and cycles of gross capital inflows and GDP growth rate for the EMDEs from 1991-2015. Even though gross capital inflows and GDP growth rate did not appear to closely follow the same path, there was a thought-provoking pattern that the two variables were conceivably related. During the first episode of capital inflows between 1991 and 2002, GDP growth rates in EMDEs appeared not to clearly follow the cycles of capital inflows even though GDP growth rates declined in some years when capital inflows decreased. However, GDP growth rates and capital inflows seemed to move in a similar pattern in the last two episodes of capital inflows from 2003-2015. EMDEs experienced higher GDP growth rates during the years that capital inflows increased and their economies performed poorly during the years of declining capital inflows. Based on this descriptive analysis of the data, there are potential linkages between capital inflows and economic growth in EMDEs during the study period. This relationship warrants further examination by formal econometric analysis.

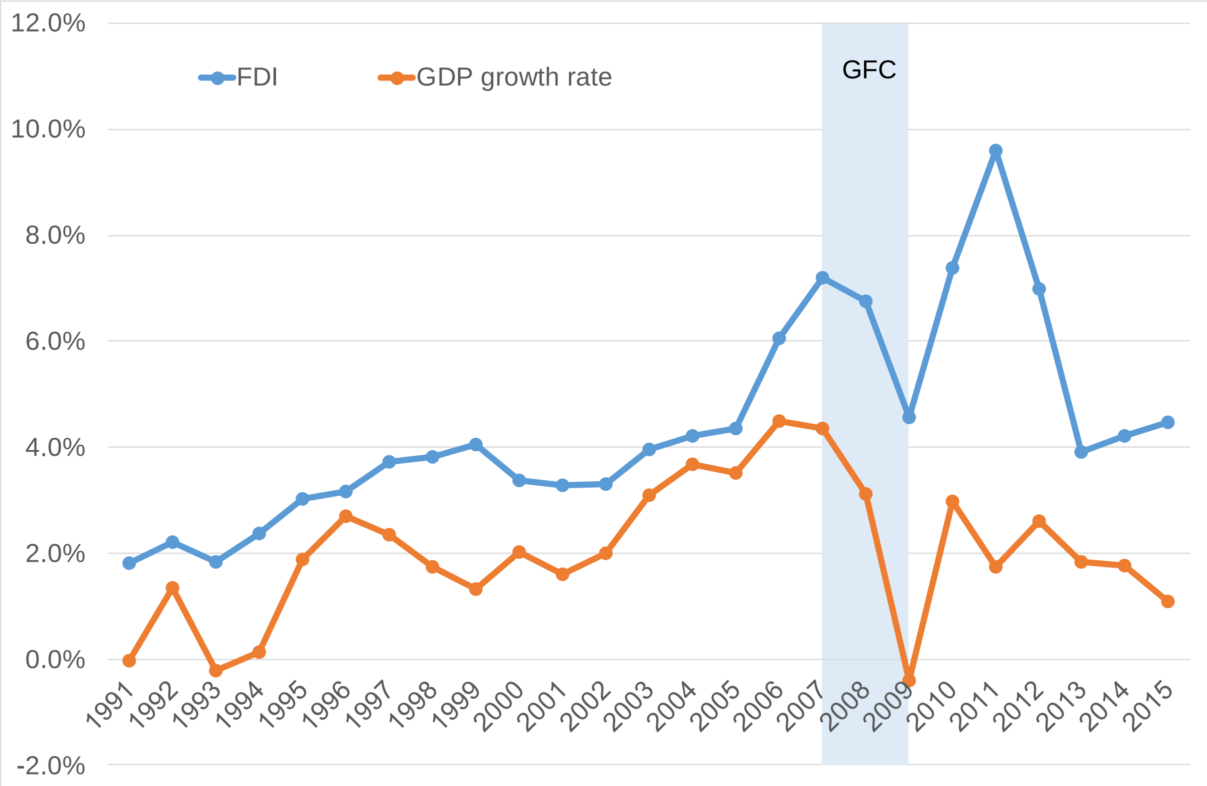
Figure 4.6 Trends of gross capital inflows and GDP growth rate in EMDEs from 1991 to 2015



Source: Author's calculations based on data from the IMF BOP and UNCTAD databases.

As discussed in section 4.2.1.1, FDI has accounted for the largest share of total financial inflows into EMDEs during the past 25 years; it may be interesting to examine the movements and trends of the FDI inflows and GDP growth rates in EMDEs as illustrated by Figure 4.7. During 1991-2015, FDI inflows and GDP growth rates appeared to move similarly. When the FDI inflows had rose steadily from 1991 to 2007, the GDP growth rates also rose. During periods of declining FDI inflows, especially during the 2008-2009 GFC, the GDP growth rates also contracted significantly.

Figure 4.7 Trends of FDI inflows and GDP growth rate in EMDEs from 1991 to 2015



Source: Author's calculations based on data from the IMF BOP and UNCTAD databases.

4.2.2 Descriptive statistics of the variables

Table 4.1 presents the descriptive statistics of the five-year average data of capital inflows, GDP growth rate and other variables, used in the analyses. During 1991-2015, the average real GDP growth rate (GDPG) was 2.0% per annum but varied dramatically between -24.5% and 21.3%. The large variations in GDP growth rates of EMDEs could reflect the vast disparity of the countries' economic development over the past 25 years as well as boom-and-bust cycles of economic performance that could be affected by internal and external factors. During the same period, gross capital inflows as a percentage of GDP (GCI) averaged 6.2% and fluctuated between -662.5% and 163.7%. The capital inflow data also display high volatility, which may be because of changes in global factors such as global liquidity and monetary policy stances in developed economies. Based on the disaggregated levels of capital inflows, the average FDI as a percentage of GDP (FDI) was 4.5% whereas the non-FDI inflows as a percentage of GDP (NONFDI) averaged 1.5% over the sample period. For the decomposed non-FDI inflows, OI inflows as a share of GDP registered an average of 1.9% and the average PFE and PFD were 0.2% and 0.5%, respectively.

Gross fixed capital formation (GFCF) as a percentage of GDP registered an average of 22.9% with a maximum of 62.4%, reflecting the different levels of capital stock for a large sample of economies. The enrolment rate in secondary school education (SE), which is a proxy for human capital, recorded an average of 64.8%. Financial development (FD), measured as credit provision to the private sector by banks as a share of GDP, reported an average of 31.3% over the sample period, reflecting the low level of financial sector development in EMDEs. Institutional quality (IQ) is proxied by the corruption control index from the WGI database with the index scores ranging from -2.5 (weak performance) to 2.5 (best performance). The variable had an average value of -0.35, reflecting poor performance in the control of corruption in EMDEs. Lastly, natural logarithms are applied to the initial-period per capita GDP (GDPPC_INT) and total population (POP) variables to reduce their skewness and make the interpretation easier because the data of these two variables have excessively huge values and wide variations. It is also a general practice to apply natural logarithms to these two variables in empirical analysis. The average value of the GDPPC_INT in natural logarithms is 7.8, with a relatively high standard deviation of 1.2, reflecting the different economic development levels of the 130 economies in the sample. POP has an average value of 15.5 in natural logarithms with a standard deviation of 2.1, indicating the different sizes of the labour markets.

Table 4.1 Summary statistics of the variables used in the CIF-EG model from 1991 to 2015

Variable	Obs	Mean	Std.Dev.	Min	Max
GDPG	645	.019	.038	-.245	.213
GCI	556	.062	.314	-6.625	1.637
FDI	556	.015	.297	-6.653	1.379
NONFDI	603	.045	.083	-.059	1.606
PFE	466	.002	.011	-.044	.164
PFD	490	.005	.011	-.064	.076
OI	604	.019	.107	-1.388	1.619
GDPPC_INT	642	7.845	1.204	5.078	11.129
GFCF	568	.229	.082	0	.624
SE	553	.648	.28	.053	1.152
POP	650	15.503	2.147	9.121	21.029
FD	626	.313	.239	.002	1.429
IQ	650	-.347	.679	-1.648	1.572

Source: Author's calculations based on data from various databases.

4.3 Baseline Empirical Analysis

4.3.1 Introduction

Econometric analysis of the links between capital inflows and economic growth begins with the estimation of a parsimonious baseline model as proposed in section 3.3. Capital inflows are augmented into the cross-country growth regression model with key control variables such as initial-period development level, capital stock, human capital, and labour force, which are proxied by GDPPC_INT, GFCF, SE, and POP, respectively. The variables' measures are discussed in section 3.3.3 and their definitions are provided in Table B.1 (see Appendix B).

Empirical investigation of the relationship between capital inflows and economic growth was undertaken at both aggregated and disaggregated levels of capital inflows. As discussed in section 2.4, the composition of capital inflows potentially matters for economic growth. Different forms of capital inflows could generate distinct impacts on economic growth. A granular analysis is essential to provide more insightful evidence for policymaking concerning capital flow management in EMDEs.

We first estimate the regression model (equation 4.1) that evaluates the capital inflow impact at the aggregate level (i.e., GCI) on GDP growth rate. Next, the capital inflows' impacts are analysed at disaggregated levels by decomposing gross capital inflows into FDI and NONFDI inflows (equation 4.2); the NONFDI inflows are further disaggregated into PFE, PFD and OI inflows (equation 4.3). Given that FDI is the largest contributor of GCI to EMDEs, we specify another model that includes only FDI as the capital inflow variable of interest with the other three types of capital inflows excluded. Specifically, with the same set of control variables, the following specifications are estimated:

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta GCI_{it} + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \tag{4.1}$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \beta_2 NONFDI_{it} + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \tag{4.2}$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \beta_3 PFE_{it} + \beta_4 PFD_{it} + \beta_5 OI_{it} + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \tag{4.3}$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \tag{4.4}$$

4.3.2 Pearson pairwise correlation

To investigate the CIF-EG nexus, we examine the simple correlation among the variables used in the econometric models with the Pearson pairwise correlation approach. The purpose of the correlation analysis among the variables is two-fold. The first purpose is to check the direction and strength of the relationships among the variables, especially the relationships between the main independent variables (i.e., capital inflows) and the dependent variable (i.e., GDPG). The second purpose is to test whether there is possibly any multicollinearity problem, i.e., if the correlation between the variables is perfect or nearly perfect.

The Pearson pairwise correlation matrix between variables is presented in Table 4.2. Based on the correlation coefficients, GDPG generally has weak, positive relationships with all other variables observed. However, it has negative correlations with GDPPC_INT and SE, although both correlations are statistically insignificant. The negative relationship between GDPG and GDPPC_INT aligns with the convergence proposition suggesting that an economy with a low development level at the beginning period tends to grow faster whereas an economy with a high development level tends to grow more slowly. In relation to our main independent variables, GCI and its different components, GDPG shows weak, positive relationships. The correlation coefficients between GDPG and the capital inflow variables are very small, ranging from 0.035 to 0.117. GDPG is significantly correlated with FDI and GCI at the 1% and 10% levels, respectively, but it is not significantly related to the other capital inflow forms (i.e., NONFDI, PFE, PFD and OI). Among the different types of capital inflows, GDPG exhibits the highest level of correlation with FDI. GDPG is also significantly correlated with GFCF, POP and FD at the 1% significance level and with IQ at the 5% significance level.

GCI is strongly significantly associated with all types of capital inflows, but it is weakly and insignificantly related to any other observed independent variables. There is no doubt about these strong correlations because the different capital inflow components are summed to form GCI. FDI is significantly correlated with all other observed independent variables (i.e., GDPPC_INT, GFCF, SE, POP, FD and IQ) at the 1% level although the correlations are generally weak. Similarly, OI is significantly correlated with these variables. PFE and PFD are significantly associated with only SE, FD and IQ.

The correlations between the other observed variables (i.e., GDPPC_INT, GFCF, SE, POP, FD and IQ) are generally weak or moderate. However, the correlations among these variables are all statistically significant, except for the correlation between GFCF and POP. Exceptionally, the correlation between GDPPC_INT and SE is strong (0.748), which is the highest among the different pairs of independent variables; the correlation is significant at the 1% level.

In summary, the pairwise correlation analysis underlines that there exists a non-multicollinearity problem among the variables because the correlation coefficient of each pair of variables is less than the rule-of-thumb value of 0.80 where a multicollinearity problem is suspected (Salkind, 2017). Interestingly, the correlation analysis shows that GDPG is significantly correlated with GCI and FDI although the relationships are weak. These results may indicate a link between economic growth and GCI or FDI. However, as correlation analysis cannot detect causality between the variables, the interconnectedness between economic growth and capital inflows deserves further analysis as discussed in the following sections.

Table 4.2 Correlation matrix of the variables used in the CIF-EG model

	GDPG	GCI	FDI	NONFDI	PFE	PFD	OI	GDPPC_INT	GFCF	SE	POP	FD	IQ
GDPG	1												
GCI	0.074*	1											
FDI	0.117***	0.317***	1										
NONFDI	0.044	0.961***	0.047	1									
PFE	0.035	0.568***	0.727***	0.158***	1								
PFD	0.047	0.263***	0.130***	0.262***	0.116**	1							
OI	0.060	0.159***	0.021	0.154***	0.042	0.206***	1						
GDPPC_INT	-0.061	-0.007	0.113***	-0.038	0.131***	0.262***	0.082**	1					
GFCF	0.289***	0.063	0.152***	0.019	0.029	0.068	0.093**	0.190***	1				
SE	-0.017	0.069	0.137***	0.034	0.124**	0.260***	0.163***	0.748***	0.219***	1			
POP	0.103***	-0.044	-0.188***	0.013	-0.000	0.014	-0.101**	-0.283***	-0.066	-0.188***	1		
FD	0.109***	0.063	0.217***	0.006	0.244***	0.193***	0.072*	0.497***	0.314***	0.456***	-0.094**	1	
IQ	0.079**	-0.018	0.140***	-0.057	0.143***	0.179***	0.105***	0.599***	0.215***	0.440***	-0.469***	0.457***	1

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.

Source: Author’s estimations.

4.3.3 Diagnostic tests before the SGMM estimation

This section presents the results of major diagnostic tests before the SGMM estimator is used to estimate the proposed dynamic panel data models (equations 4.1 to 4.4). SGMM is designed to tackle endogeneity, a major issue in empirical economic and financial studies. As such, this section demonstrates the results of the statistical tests for the presence of endogenous regressors in the models. Tests for heteroscedasticity and autocorrelation are also performed to check whether the models suffer from these issues because the GMM method is more efficient than the OLS and FE estimators in cases of heteroscedasticity and autocorrelation (Wooldridge, 2001, 2010).

The Durbin-Wu-Hausman (DWH) test is conducted to test for endogeneity under the null hypothesis that all the regressors in the model can be treated as exogenous (Schultz, Tan, & Walsh, 2010; Ullah, Akhtar, & Zaefarian, 2018). The DWH test statistic follows the Chi-squared (χ^2) distribution and the degrees of freedom equal the number of suspected endogenous regressors. In empirical economic analysis, macroeconomic variables are often endogenous variables. In the proposed capital inflows-augmented growth models, all the independent variables including lagged GDPG, GCI, FDI, NONFDI, PFE, PFD, OI, GDPPC_INT, GFCF, SE and POP, are possibly endogenous. These independent variables are treated as endogenous in the tests. To conduct the DWH test, the four models (equations 4.1 to 4.4) are estimated using the 2SLS estimator and one-year lagged differences of the potentially endogenous variables as the instruments following Wintoki et al. (2012).

Table 4.3 reports the outputs of the DWH tests for Models 1 to 4. The results show that the null hypothesis that these regressors can be treated as exogenous is rejected at the 1% significance level for Models 1, 2 and 3 and at the 5% level for Model 4. Therefore, these results reinforce the justification for the use of the SGMM estimator in estimating the models.

The Modified Wald (MW) test is carried out to test for heteroscedasticity in dynamic panel data models. According to Baum (2001), the MW test, which is suitable for panel data, follows the Chi-squared (χ^2) distribution with the null hypothesis that there is no group heteroscedasticity in residuals. The MW test is carried out by first estimating the four models using the FE estimator. Then the residuals are checked to see whether group heteroscedasticity is present. The results in Table 4.3 reject the null hypothesis that the residuals in Models 1 to 4 are homoscedastic at the 1% significance level. As argued by Drukker (2003), the Wooldridge (2002) test is suitable for linear panel data models, which is the case for this study's baseline models. This study, thus, applies the Wooldridge (2002) test to check for autocorrelation in the models. Table 4.3 shows that the null hypothesis of no serial correlation is, at the 1% significance level, rejected for all four models. In summary, the results of these statistical tests reinforce the justification for using the SGMM estimator in estimating the four dynamic panel data models because it is more efficient than the OLS and FE estimators under the conditions of heteroscedasticity and serial correlation.

Table 4.3 Diagnostic test results before the SGMM estimation of Models 1 to 4

	Model 1	**Model 2**	**Model 3**	**Model 4**
Durbin-Wu-Hausman test (Null hypothesis: Right-hand side variables as a group are exogenous.)				
Test statistic	χ^2 (6) = 18.09	χ^2 (7) = 20.89	χ^2 (9) = 27.75	χ^2 (6) = 13.17
p-value	0.0060***	0.0039***	0.0011***	0.0404**
Modified Wald test (Null hypothesis: Homoscedasticity)				
Test statistic	χ^2(114) = 1.3x10^6	χ^2 (1114) = 2.6x10^6	χ^2 (103) = 1.7x10^9	χ^2 (115) = 3.1x10^5
p-value	0.0000***	0.0000***	0.0000***	0.0000***
Wooldridge test (Null hypothesis: No autocorrelation)				
Test statistic	F(1, 77) = 18.88	F(1, 77) = 18.88	F(1, 58) = 14.07	F(1, 86) = 16.96
p-value	0.0000***	0.0000***	0.0004***	0.0001***

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.

Source: Author's estimations.

4.3.4 Post-estimation diagnostic tests

This section presents the results of the diagnostic tests after the CIF-EG model is estimated by the two-step SGMM estimator. This study uses the two-step SGMM rather than the one-step SGMM method for two reasons. First, the two-step SGMM estimation can correct the standard errors of the coefficient estimates, which are likely to be downward biased (Roodman, 2009a). In other words, the two-step SGMM method is more efficient and robust than the one-step method in the context of heteroscedasticity and autocorrelation. Second, the two-step SGMM method can automatically provide the Difference-in-Hansen tests to check the validity of the instrument subsets used to estimate the model (Roodman, 2009a).

The results of the post-estimation diagnostic test are examined to ensure that the SGMM estimation results can be validly inferred. Table 4.4 reports the diagnostic test results of the estimated baseline Models 1 to 4 that evaluate the impacts of GCI and its different components on GDPG.

To ensure that the estimation results of a dynamic panel data model using the SGMM method can be validly inferred, five conditions must be satisfied (Baltagi, 2013; Baltagi et al., 2009; Roodman, 2009a, 2009b). In particular, Roodman (2009a, 2009b) provided a detailed discussion on the criteria to ensure the estimation results using the SGMM estimator can be authentically inferred. First, the SGMM estimator entails no second-order serial correlation AR(2) in the residuals (Arellano & Bond, 1991). Given the fact that the AR(2) tests' p-values for the estimated Models 1 to 4 are 0.281, 0.328, 0.228

and 0.194, respectively, the null hypothesis of no second-order serial correlation in the residuals cannot be rejected at all conventional significance levels. Hence, this necessary condition is satisfied.

Table 4.4 The SGMM post-estimation diagnostic tests of Models 1 to 4

	Model 1	**Model 2**	**Model 3**	**Model 4**
AR(1) in first differences (p-value)	0.001***	0.001***	0.003**	0.001***
AR(2) in first differences (p-value)	0.281	0.328	0.228	0.194
Hansen J. test for over-identification of instruments	$\chi^2(55) = 63.08$ Prob > $\chi^2 = 0.212$	$\chi^2(63) = 67.42$ Prob > $\chi^2 = 0.328$	$\chi^2(43) = 48.79$ Prob > $\chi^2 = 0.252$	$\chi^2(48) = 52.49$ Prob > $\chi^2 = 0.304$
Difference-in-Hansen tests (p-value): *- GMM instruments for levels* *- IV*	0.399 0.611	0.472 0.585	0.354 0.220	0.243 0.277
Number of instruments	67	76	58	60
Number of groups	114	114	103	115
Unity of the lagged DV coefficient	0.109	0 .104	0.100	0.120

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

Second, the Hansen J. test for over-identification of instruments is fundamentally a test of the validity of the instruments used in estimating the model. With respect to the p-values of 0.212, 0.328, 0.252 and 0.304 for Models 1 to 4, the null hypothesis that the instruments are exogenous cannot be rejected at all standard significance levels. The results, thus, show that the instrument sets used in the estimated Models 1 to 4 are correctly identified or valid.

Third, the SGMM requires an essential assumption that the subsets of instruments (i.e., lagged differences for level equation) are exogenous. This assumption can be directly tested using the Difference-in-Hansen test. As shown in Table 4.4, the p-values of the four models cannot pass all the standard significance levels, thereby implying that the null hypothesis – the instrument subsets are exogenous – cannot be rejected.

Fourth, as suggested by Roodman (2009a), there should be a report of the number of instruments used in estimating the dynamic panel data model because a large number of instruments may produce weak instruments that could lead to biased estimates. As a guide, the number of instruments should be fewer than the number of individual panel units. In this regard, the sets of instruments used in the four models in Table 4.4 are fewer than the number of individual panel units.

Finally, to check the validity of the instruments, the SGMM estimator requires the "steady state" assumption. The steady state assumption means that the coefficient of the lagged dependent variable should be less than an absolute value of one. Table 4.4 shows the coefficient of the lagged GDPG variable of the four models is less than one, indicating that the steady-state assumption holds.

In summary, the post-estimation diagnostic test results show that all necessary assumptions required to ensure the validity of the SGMM estimator used to estimate the four models are satisfied. Therefore, the diagnostic tests indicate that the estimation results of the four models using the SGMM estimator are econometrically reliable and can be authentically interpreted. The estimation results and discussion are presented in the next section.

4.3.5 Baseline estimation results and discussion

The baseline results of the CIF-EG model estimated by the two-step SGMM estimator are presented in Table 4.5. In Table 4.5, Column 1 shows the estimation results of the relationship between GCI and GDPG (Model 1). Column 2 shows the estimation results when GCI is disaggregated into FDI and NONFDI inflows (Model 2). Column 3 presents the estimation results of Model 3 when GCI is further disaggregated into FDI, PFE, PFD and OI inflows. Finally, Column 4 shows the estimation results of Model 4 when FDI is the only capital inflow variable in the model.

The lagged GDPG is statistically significant and positive at the 10% level for all specifications, except for Model 3 where capital inflows are decomposed into FDI, PFE, PFD and OI. These results provide weak evidence that economic growth in EMDEs is persistent. This weak evidence may be because five-year average data are used in the analysis. This statistical evidence underlines that the past performance of the economy positively contributes to current economic performance. This agrees with prior studies (Kyaw & Macdonald, 2009; Trabelsi & Cherif, 2017). This also indicates the dynamic relationship between capital inflows and economic growth as discussed in section 3.3.

With regard to the main independent variables of interest, the results show that capital inflows are strongly and significantly related to economic growth. For all four baseline specifications, capital inflow variables are significant at the 5% level. In Model 1, the GCI coefficient is positively significant at the 5% level. This underlines that capital inflows contribute positively to GDP growth in EMDEs. A percentage point increase in gross capital inflows as a share of GDP into EMDEs would lead to an increase of approximately 0.017 percentage points of GDP growth, *ceteris paribus*. The results parallel the findings of prior research demonstrating the positive impact of capital flows on economic growth (Delgado et al., 2014; Gehringer, 2013; Kyaw & Macdonald, 2009).

Table 4.5 The SGMM estimation results of Models 1 to 4

	Dependent Variable: GDP Growth Rate			
	(1)	(2)	(3)	(4)
Lagged GDPG	0.109*	0.104*	0.100	0.120*
	(0.062)	(0.059)	(0.067)	(0.071)
GCI	0.017**			
	(0.008)			
FDI		0.019**	0.033**	0.020**
		(0.008)	(0.015)	(0.008)
NONFDI		0.003		
		(0.007)		
PFE			-0.121	
			(0.144)	
PFD			-0.124	
			(0.234)	
OI			-0.029	
			(0.025)	
GDPPC_INT	-0.012***	-0.012***	-0.012**	-0.011***
	(0.004)	(0.004)	(0.006)	(0.003)
GFCF	0.084**	0.090**	0.163***	0.086**
	(0.035)	(0.035)	(0.040)	(0.042)
SE	0.057***	0.058***	0.046**	0.050***
	(0.015)	(0.014)	(0.020)	(0.012)
POP	0.005**	0.005***	0.006**	0.005*
	(0.002)	(0.002)	(0.003)	(0.003)
Constant	-0.011	-0.027	-0.056	0.000
	(0.048)	(0.043)	(0.066)	(0.000)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	356	356	300	377
Number of countries	114	114	103	115

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

A more in-depth investigation reveals that the composition of capital inflows matters for economic growth. Based on the estimation results of Models 2 to 4, there is strong evidence that only FDI generates a positive impact on economic growth in EMDEs. When GCI is disaggregated into FDI and NONFDI (Model 2), only FDI is positive and significant at the 5% level. With Model 3, when GCI is disaggregated into more detailed components, including FDI, PFE, PFD and OI, the FDI remains positively significant at the 5% level but the other three types of capital inflows are statistically insignificant. The result emphasises the positive impact of FDI on economic growth in EMDEs.

To verify this empirical result, another specification, with FDI included as the only capital inflow variable, is estimated with the same control variables (Model 4). Again, the coefficient of FDI is positive and significant at the 5% level. The result reaffirms the FDI's positive effect on GDP growth in EMDEs.

This agrees with the longstanding view that FDI is beneficial for host economies in promoting economic growth. As pointed out by previous research (Feeny, Iamsiraroj, & McGillivray, 2014; Gui-Diby, 2014), FDI generates growth-enhancing effects in developing countries. However, these studies failed to account for the other forms of capital inflows (e.g., PFE, PFD and OI) thereby neglecting the independent effect of FDI. This study's findings fill the literature gaps by showing that the composition of capital inflows matters for economic growth and that the growth-enhancing effect of FDI is independent of other forms of capital inflows.

Regarding the four control variables, their coefficients are statistically significant across all four specifications. The coefficient of GDPPC_INT is negative and significant at the 1% level for Models 1, 2, and 4 and at the 5% level for Model 3. The coefficient's sign is consistent with the a priori that there is a convergence effect. That means an economy with a high development level measured by GDP per capita is expected to experience lower economic growth whereas a less developed economy may experience higher economic growth. Because of the diminishing returns on economic factors such as capital and labour, the per capita income of all economies will converge to a steady state where there is no more growth of capital per worker and labour productivity and thus the growth rate of national income is the same as the growth rate of the labour force (De Janvry & Sadoulet, 2016).

The coefficient of GFCF presents positive, significant signs for all four specifications. It is significant at the 1% level for Model 3 and at the 5% level for Models 1, 2 and 4. The results indicate that GFCF, which is the economy's capital stock, plays a growth-enhancing role as predicted by the neoclassical growth model. Similarly, the coefficient of SE is positively significant for all four specifications, at the 1% level for Models 1, 2 and 4 and at the 5% level for Model 3. These significant results reaffirm the positive role of human capital in driving economic growth, which is consistent with the theoretical argument suggested by Lee and Barro (2001) and Barro (2003).

Another control variable is POP, which is a proxy for the labour force in the economy. The POP coefficient is positive and significant across the four specifications. The coefficient is significant at the 1% level for Model 2, at the 5% level for Models 1 and 3, and at the 10% level for Model 4. The result underlines the positive impact of the labour force on economic performance, which is consistent with neoclassical growth theory.

4.4 Role of Absorptive Capacity: Financial Development

4.4.1 Introduction

Based on the results presented in section 4.3, capital inflows generate direct positive impacts on economic growth in EMDEs. The result is consistent with the theoretical prediction that foreign capital helps propel economic growth in the capital-recipient economy. However, according to the literature as discussed in section 2.4, the relationship between capital inflows and economic growth may lean on certain domestic conditions of the capital-recipient economy (Borensztein et al., 1998; Kose et al., 2011). In this regard, we investigate the role of the absorptive capacity of the capital-recipient economy in dealing with the links between capital inflows and economic growth.

As discussed in section 2.4.2, the financial development could play an anchor role in deriving the growth-enhancing effects of capital inflows. Further, it can be argued that there is a threshold level of financial development in mediating the capital inflows-economic growth nexus. To test whether the impact of capital inflows on economic growth is conditional on the financial development level of the capital-recipient economy, the baseline model between GCI and GDPG (Model 1) is re-specified to include both linear and quadratic interaction terms between GCI and FD variables following previous studies (Islam, 2016; Kose et al., 2011).

As the baseline regression results show, only FDI, among the different types of capital inflows, generates growth-enhancing effects in the capital-recipient economy. As a robustness test, we conduct more regression analyses by including linear and quadratic interaction terms between FDI and FD in the FDI and NONFDI model (equation 4.6), the granular model (equation 4.7), and a separate FDI model (equation 4.8) where only FDI is included but the other three forms of capital inflows are excluded. Thus, the four new specifications (equation 4.5 to 4.8), estimated using the same two-step SGMM estimator, are in the following forms. The variables' measures are discussed in section 3.3.3 and their definitions are provided in Table B.1 (see Appendix B).

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta GCI_{it} + \tau_1 FD_{it} + \tau_2 FD_{it}^2 + \theta_1 (GCI_{it} * \mathrm{FD}_{it}) + \theta_2 (GCI_{it} * FD_{it}^2) + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \quad (4.5)$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \beta_2 NONFDI_{it} + \tau_3 FD_{it} + \tau_4 FD_{it}^2 + \theta_3 (FDI_{it} * \mathrm{FD}_{it}) + \theta_4 (FDI_{it} * FD_{it}^2) + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \quad (4.6)$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \beta_3 PFE_{it} + \beta_4 PFD_{it} + \beta_5 OI_{it} + \tau_3 FD_{it} + \tau_4 FD_{it}^2 + \theta_3 (FDI_{it} * \mathrm{FD}_{it}) + \theta_4 (FDI_{it} * FD_{it}^2) + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \quad (4.7)$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \tau_3 FD_{it} + \tau_4 FD_{it}^2 + \theta_3 (FDI_{it} * \mathrm{FD}_{it}) + \theta_4 (FDI_{it} * FD_{it}^2) + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \quad (4.8)$$

4.4.2 Capital inflows and financial development: Linear and quadratic interaction terms

The construction of an interaction variable by multiplying two variables of interest often generates a multicollinearity problem because this multiplicated variable is generally highly correlated with the two variables or one of them. This multicollinearity problem can contaminate the model estimations because multicollinearity increases the standard errors of the regression coefficients, which will make the coefficients less likely to be statistically significant (Farrar & Glauber, 1967). To circumvent this multicollinearity problem, following previous studies (Azman-Saini, Baharumshah, & Law, 2010; Gui-Diby, 2014), this study applies a novel two-step method to create the interaction variables between capital inflows and FD. The first step is multiplication of the capital inflows and FD variables (i.e., GCI*FD, GCI*FD^2, FDI*FD, FDI*FD^2) to obtain the products of the two variables. The second step is regression of the product variable on the capital inflows and FD. Next, the residuals of the regressions are used as the interaction variables in the re-specified regression models (equations 4.5 to 4.8).

4.4.3 Post-estimation diagnostic tests

It is worth noting that an economy (i.e., a panel unit) is dropped from the regression analyses because of insufficient observations of FD variable. Before the estimation results are discussed, we begin by examining the results of the post-estimation diagnostic tests required to ensure the validity of the SGMM estimator. Table 4.6 shows all major conditions to ensure the validity of the SGMM estimator are satisfied for all four regression models. First, the null hypothesis of no second-order serial correlation AR(2) in the residuals (Arellano & Bond, 1991; Roodman, 2009a) cannot be rejected at all conventional significance levels for all four models.

Table 4.6 The SGMM post-estimation diagnostic tests of Models 5 to 8

	Model 5	**Model 6**	**Model 7**	**Model 8**
AR(1) in first differences (p-value)	0.002***	0.002***	0.009**	0.002***
AR(2) in first differences (p-value)	0.458	0.406	0.571	0.330
Hansen J. test for over-identification of instruments	$\chi^2(53) = 56.70$ Prob > χ^2 = 0.339	$\chi^2(31) = 26.41$ Prob > χ^2 = 0.701	$\chi^2(39) = 38.81$ Prob > χ^2 = 0.479	$\chi^2(32) = 27.98$ Prob > χ^2 = 0.671
Difference-in-Hansen tests (p-value): - *GMM instruments for levels* - *IV*	0.359 0.435	0.563 0.526	0.470 0.888	0.523 0.719
Number of instruments	69	48	58	48
Number of groups	113	113	103	114
Unity of the lagged DV coefficient	0.139	0 .187	0.138	0.180

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

Second, the Hansen J. tests for over-identifying restrictions, which are tests of internal instrument validity used in estimating the models, show that the instrument sets in all four regressions are exogenous given that the p-values of the four models are above any conventional significance level. Third, for all regression models, the p-values of the Difference-in-Hansen tests do not pass any traditional significance level. Thus, the null hypothesis – the subsets of instruments used to estimate the models are exogenous – cannot be rejected, thereby meeting another important condition to ensure the validity of the SGMM estimator. Fourth, Table 4.6 shows that the number of instruments used in the estimation is fewer than the number of individual panel units, as suggested by Roodman (2009a). Finally, the steady-state assumption of the SGMM estimator holds for all four regression models because the absolute value of the coefficient of the lagged dependent variable (i.e., lagged GDPG) is less than one. In summary, the post-estimation diagnostic tests show that all necessary conditions required to make the SGMM estimator valid for all four regression models are satisfied.

4.4.4 Estimation results and discussion

Table 4.7 presents the estimation results of Models 5 to 8. The lagged GDPG coefficient continues to exhibit positive, significant signs across all specifications. It is significant at the 5% level for Models 5, 6 and 8 and at the 10% level for Model 7. The point estimates of the coefficients are somewhat higher than those of the baseline results. They are between 0.14 and 0.19, compared with the baseline estimates between 0.10 and 0.12. Economically, a percentage point increase in GDP growth in the preceding year contributes to this year's GDP growth by approximately 0.14 to 0.19 percentage points. The results reiterate the persistent, dynamic characteristics of economic growth in EMDEs.

Generally, the coefficients of the capital inflow variables remain positive and statistically significant for all specifications. The GCI coefficient in Model 5 is positively significant at the 5% level, with a magnitude of 0.015, which is closely similar to that of the baseline model (Model 1). Likewise, the FDI coefficient is significant at the 5% and 10% levels for Model 6 and Model 8, respectively, but insignificant for Model 7. The statistical significance of FDI coefficient changes slightly may be because of the significant roles played by FD and the squared FD variables. But the FDI coefficient remains positive for all three specifications (Models 6 to 8). In general, the analysis shows that capital inflows generate direct positive impacts on economic growth in EMDEs.

The control variables' coefficients continue to exhibit consistent signs although their statistical significances change slightly. The coefficient of GDPPC_INT is statistically significant at the 10% level for Models 6 to 8, but insignificant for Model 5. However, it is negative across all four specifications. The coefficient of GFCF is positively significant at the 1% level for Model 7, at the 5% level for Model 5, at the 10% level for Model 6, but insignificant for Model 8. Interestingly, the SE coefficient is strongly significant at the 1% level for all four specifications and it is consistently positive. Finally, the POP coefficient is insignificant for Models 5, 6, and 8 but significant at the 10% level for Model 7. It continues to show positive signs as did those of the baseline models.

Table 4.7 The SGMM estimation results of Models 5 to 8

	Dependent Variable: GDP Growth Rate			
	(5)	(6)	(7)	(8)
Lagged GDPG	0.139**	0.187**	0.138*	0.180**
	(0.064)	(0.075)	(0.081)	(0.072)
GCI	0.015**			
	(0.006)			
FDI		0.039**	0.029	0.039*
		(0.017)	(0.035)	(0.023)
NONFDI		0.005		
		(0.008)		
PFE			0.316	
			(0.238)	
PFD			0.094	
			(0.297)	
OI			-0.050	
			(0.037)	
GDPPC_INT	-0.003	-0.008*	-0.008*	-0.008*
	(0.007)	(0.005)	(0.005)	(0.005)
GFCF	0.108**	0.069*	0.134***	0.060
	(0.042)	(0.039)	(0.051)	(0.041)
SE	0.056***	0.063***	0.045***	0.061***
	(0.016)	(0.013)	(0.017)	(0.014)
POP	0.003	0.003	0.006*	0.002
	(0.002)	(0.002)	(0.003)	(0.003)
FD	-0.186***	-0.178**	-0.115*	-0.159**
	(0.067)	(0.074)	(0.060)	(0.077)
FD-squared	0.158**	0.147**	0.095*	0.132*
	(0.062)	(0.065)	(0.058)	(0.069)
GCI*FD	-0.246			
	(0.203)			
GCI*FD-squared	0.156			
	(0.153)			
FDI*FD		-0.351	-0.535	-0.430
		(0.262)	(0.643)	(0.296)
FDI*FD-squared		0.174	0.239	0.233
		(0.221)	(0.533)	(0.249)
Constant	0.000	0.000	-0.050	0.025
	(0.000)	(0.000)	(0.072)	(0.078)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	351	351	296	372
Number of countries	113	113	103	114

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

The coefficients of the FD and squared FD variables are both significant across the four specifications. The FD coefficient is significant at the 1% level for Model 5, at the 5% level for Models 6 and 8, and at the 10% level for Model 7. Similarly, the coefficient of squared FD is statistically significant at the 5% level for Models 5 and 6 and at the 10% level for Models 7 and 8. Importantly, the coefficients of both variables exhibit consistent signs, negative and positive, for FD and squared FD, respectively. In this sense, FD has a quadratic relationship with economic growth in EMDEs. Financial sector is supportive of economic growth when it passes a certain threshold level. Below the threshold, financial sector performs poorly in allocating financial resources to promote productive capacity and national outputs. The results are consistent with the previous findings that demonstrate the positive role of FD in propelling economic growth (Barajas et al., 2016; King & Levine, 1993; Klein & Olivei, 2008). More importantly, the study's results agree with literature that indicates a non-linear relationship between FD and economic growth (Islam, 2016; Kose et al., 2011).

For the interaction variables between the capital inflows and FD, which are of analytical interest, are not statistically significant across the four specifications (Models 5 to 8). However, the coefficients of both the linear and quadratic interaction terms exhibit the same signs for all regression models, negative and positive, respectively. Despite being statistically insignificant, the coefficient signs seem to indicate that when an economy possesses the first threshold level of FD, capital inflows will result in a negative economic growth impact. Unless the economy reaches a higher threshold level, FD will turn capital inflows into growth-enhancing effects. The results contrast with the findings of the previous few studies (Kose et al., 2011; Kyaw & Macdonald, 2009). However, it is important to note that Kose et al. (2011) found a direct negative link between total capital flows (i.e., the sum of gross capital inflows and outflows) and economic growth, but the authors showed that the capital flows' impact on economic growth become positive when the host economy had a certain threshold of FD. Interestingly, this study's findings, to a certain extent, are similar to those of Gui-Diby (2014), who showed that the interaction term between FDI and SE is statistically insignificant.

4.4.5 Robustness check: Additional control variables

The results of the regression Models 5 to 8 show only FDI among the different type of capital inflows has a positive impact on economic growth. FD has a quadratic relationship with economic growth. Additional regression analyses were performed to test the robustness of the results. Robustness tests are conducted by including additional control variables that are potentially important for economic growth in regression Model 8, depicting the relationship between FDI and economic growth. The additional control variables are: financial openness (FO), trade openness (TO), inflation rate (IFR), government consumption (GC) and the enrollment rate in tertiary education (TE). Since the regression analysis includes additional control variables one at a time, there are five new models to be estimated (Models 9 to 13). The variables' definitions are provided in Table B.1 (see Appendix B).

Table 4.8 presents the results of the diagnostic tests of the re-estimated models with the additional control variables (Models 9 to 13). All major necessary assumptions to ensure the validity of the SGMM estimator are satisfied. The null hypothesis of no second-order serial correlation AR(2) in the residuals (Arellano & Bond, 1991; Roodman, 2009a) in the five models cannot be rejected at all conventional significance levels so one major assumption is satisfied. The second major assumption of the validity of the instruments used in estimating all five models is fulfilled because the Hansen J. tests result in the p-values of over the 10% significance level. Besides these primary assumptions, the other requirements to ensure the validity of the SGMM estimator are fulfilled as shown in Table 4.8. Hence, the estimation results of Models 9 to 13 can be inferred and interpreted in economic significance.

Table 4.8 The SGMM post-estimation diagnostic tests of Models 9 to 13

	Model 9	**Model 10**	**Model 11**	**Model 12**	**Model 13**
AR(1) in first differences (p-value)	0.003***	0.001***	0.001**	0.001**	0.001***
AR(2) in first differences (p-value)	0.559	0.311	0.293	0.159	0.559
Hansen J. test for over-identification of instruments	$\chi^2(31) = 25.84$ Prob > χ^2 = 0.729	$\chi^2(46) = 53.16$ Prob > χ^2 = 0.218	$\chi^2(29) = 25.27$ Prob > χ^2 = 0.664	$\chi^2(31) = 26.42$ Prob > χ^2 = 0.701	$\chi^2(29) = 25.08$ Prob > χ^2 = 0.674
Difference-in-Hansen tests (p-value): - *GMM instruments for levels* - *IV*	0.665 0.791	0.257 0.204	0.624 0.572	0.656 0.837	0.594 0.980
Number of instruments	48	63	46	48	46
Number of groups	112	112	114	112	111
Unity of the lagged DV coefficient	0.149	0 .169	0.165	0.155	0.170

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

Table 4.9 presents the estimation results of Models 9 to 13. The coefficient of the lagged GDPG remains positively significant for all five models. This result again justifies the use of a dynamic modelling method in characterising the dynamics of GDP growth rate and analysing the CIF-EG nexus. The independent variable of interest, FDI, continues to show positive, significant coefficients for all five models. Thus, the growth-enhancing effects of the FDI in EMDEs are further confirmed.

Likewise, the impacts of FD on economic growth remain unchanged. The coefficients of the FD and squared FD variables continue to exhibit consistent signs and statistical significance across the five models. The coefficient of the FD is significant at the 5% level for Models 9, 10 and 12 and at the 10% level for Models 11 and 13; its sign is consistently negative for all five models. The coefficient of the squared FD variable is generally positive for all models and significant at the 5% level for Models 9 and 10 and at the 10% level for Models 11, 12 and 13. Both the linear and quadratic interaction terms between FDI and FD are statistically insignificant for all five models. These results underline that the positive impact of FDI on economic growth in EMDEs is not conditional on the level of financial sector development in the capital-recipient EMDEs. However, the results do indicate that the financial sector development plays an essential role in promoting economic growth in EMDEs.

Table 4.9 The SGMM estimation results of Models 9 to 13

	Dependent Variable: GDP Growth Rate				
	(9)	(10)	(11)	(12)	(13)
Lagged GDPG	0.149*	0.169**	0.165**	0.155**	0.170**
	(0.081)	(0.075)	(0.078)	(0.071)	(0.083)
FDI	0.045*	0.036**	0.069**	0.040**	0.059**
	(0.023)	(0.019)	(0.031)	(0.018)	(0.028)
GDPPC_INT	-0.006	-0.004	-0.009*	-0.005	-0.008*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)
GFCF	0.068	0.089**	0.058	0.091**	0.074
	(0.048)	(0.043)	(0.042)	(0.045)	(0.048)
SE	0.065***	0.058***	0.059***	0.051***	0.044**
	(0.014)	(0.018)	(0.015)	(0.016)	(0.022)
POP	0.002	0.003	0.003	0.004	0.002
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
FD	-0.192**	-0.153**	-0.154*	-0.128**	-0.147*
	(0.075)	(0.068)	(0.087)	(0.062)	(0.084)
FD-squared	0.183**	0.124**	0.128*	0.096*	0.138*
	(0.073)	(0.063)	(0.075)	(0.056)	(0.083)
FDI*FD	-0.365	-0.331	-0.159	-0.344	-0.573
	(0.303)	(0.276)	(0.660)	(0.305)	(0.746)
FDI*FD-squared	0.157	0.175	-0.101	0.191	0.229
	(0.267)	(0.211)	(0.544)	(0.248)	(0.583)
FO	-0.006				
	(0.006)				
TO		0.003			
		(0.012)			
IFR			-0.006		
			(0.009)		
GC				0.015	
				(0.012)	
TE					0.011
					(0.023)
Constant	0.002	-0.044	0.028	-0.007	0.012
	(0.074)	(0.073)	(0.080)	(0.068)	(0.069)
Time-fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	365	369	372	366	329
Number of countries	112	112	114	112	111

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

The coefficients of all additional control variables, however, are insignificant at all conventional significance levels. Interestingly, the coefficients of FO and IFR are negative whereas the coefficients of TO, GC and TE are positive. The results generally parallel theoretical expectations that a rise in the inflation rate will aggravate economic growth whereas trade openness, government spending and tertiary education are conducive to strong economic growth in developing countries. Based on the literature, the impacts of financial openness as measured by the de jure measures can be painted, at best, as mixed as discussed in the literature review in section 2.4.

4.5 Role of Absorptive Capacity: Institutional Quality

4.5.1 Introduction

As discussed in section 4.4, capital inflows exert direct positive impacts on economic growth and the nexus is unchanged by financial sector development in the capital-recipient EMDEs. In this section, we investigate the role of another important factor of the host economy's absorptive capacity, i.e., institutional quality, in mediating the links between capital inflows and economic growth in EMDEs.

Previous studies argued that IQ is a crucial determinant of economic growth (Acemoglu, Johnson, Robinson, & Thaicharoen, 2003; Faria, Montesinos-Yufa, Morales, & Navarro, 2016; Góes, 2016). The impact of capital flows on economic growth also relies on IQ in the host economy (Borja, 2017; Delgado et al., 2014; Kunieda et al., 2014). To check whether the impact of capital inflows on economic growth works through the IQ channel, we undertake further regression analyses by re-specifying the baseline Models 1 to 4 to include the IQ variable and the interaction variables between capital inflows and IQ. Based on the literature (Kose et al., 2011; Kurul, 2017), IQ may have a non-linear relationship with economic growth. Thus, this study includes both IQ and the squared IQ as well as linear and quadratic interaction variables between capital inflows and IQ in the re-specified models.

Baseline Model 1, depicting the GCI-EG relationship, is re-specified to include the IQ and squared IQ variables together with the interaction terms between GCI and IQ and between GCI and squared IQ (Model 14). In the baseline regression results, only FDI, among the different types of capital inflows, exhibits a positive impact on economic growth. Thus, both linear and quadratic interaction terms between the FDI and IQ are included in the re-specified FDI and NONFDI model (Model 15), the granular model (Model 16), and the separate FDI model where the other types of capital inflows are excluded (Model 17). Specifically, the re-specified models are the following four dynamic panel data models (equation 4.9 to 4.12) and they are estimated using the same two-step SGMM estimator. The variables' measures are discussed in section 3.3.3 and their definitions are provided in Table B.1 (see Appendix B).

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta GCI_{it} + \upsilon_1 IQ_{it} + \upsilon_2 IQ_{it}^2 + \pi_1 (GCI_{it} * IQ_{it}) + \pi_2 (GCI_{it} * IQ_{it}^2) + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \quad (4.9)$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \beta_2 NONFDI_{it} + \upsilon_3 IQ_{it} + \upsilon_4 IQ_{it}^2 + \pi_3 (FDI_{it} * IQ_{it}) + \pi_4 (FDI_{it} * IQ_{it}^2) + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \quad (4.10)$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \beta_3 PFE_{it} + \beta_4 PFD_{it} + \beta_5 OI_{it} + \upsilon_3 IQ_{it} + \upsilon_4 IQ_{it}^2 + \pi_3 (FDI_{it} * IQ_{it}) + \pi_4 (FDI_{it} * IQ_{it}^2) + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \quad (4.11)$$

$$GDPG_{it} = \alpha GDPG_{i,t-1} + \beta_1 FDI_{it} + \upsilon_3 IQ_{it} + \upsilon_4 IQ_{it}^2 + \pi_3 (FDI_{it} * IQ_{it}) + \pi_4 (FDI_{it} * IQ_{it}^2) + \sum_{j=1}^{n} \delta_j X_{jit} + \varepsilon_t + u_{it} \quad (4.12)$$

4.5.2 Capital inflows and institutional quality: Linear and quadratic interaction terms

The construction of both linear and quadratic interaction terms between capital inflow and the IQ variables follows a novel two-step approach as discussed in section 4.4.2 to circumvent the multicollinearity problem. The first step is multiplication of capital inflow and IQ variables to obtain the products of the two variables. Specifically, for the linear interaction term, the capital inflow variables are multiplied by the IQ variable (i.e., GCI*IQ, FDI*IQ). For the quadratic interaction term, the capital inflow variables are multiplied by the squared IQ variable (i.e., GCI*IQ^2, FDI*IQ^2). The second step is the regression of the linear and quadratic product variables, separately, on the capital inflow and IQ variables. Next, the residuals of the regressions are used as the linear and quadratic interaction variables in the re-specified models (Models 14 to 17).

4.5.3 Post-estimation diagnostic tests

Table 4.10 presents the results of the post-estimation diagnostic tests to ensure the validity of the SGMM estimator. First, the null hypothesis of no second-order serial correlation AR(2) in the residuals (Arellano & Bond, 1991; Roodman, 2009a) cannot be rejected at any conventional significance level for the four models. Second, the Hansen J. tests cannot refute, at all conventional significance levels, the null hypothesis that the instruments used in estimating the models are exogenous. Third, the null hypothesis that the subsets of instruments used in estimating the models are exogenous cannot be rejected because the p-values of the Difference-in-Hansen tests do not pass any conventional significance levels. Fourth, as argued by Roodman (2009a), the number of instruments used in the estimation should be fewer than the number of cross-sectional units; this necessary condition is fulfilled for all the models in the study. Finally, because the absolute values of the coefficient estimates of the lagged economic growth are less than one for the four models, the steady-state assumption of the SGMM estimator suggested by Roodman (2009a) is confirmed. In conclusion, all the important conditions to validate the SGMM estimator are fulfilled for the four models, thus the regression results can be economically interpreted.

Table 4.10 The SGMM post-estimation diagnostic tests of Models 14 to 17

	Model 14	Model 15	Model 16	Model 17
AR(1) in first differences (p-value)	0.000***	0.001***	0.002**	0.001**
AR(2) in first differences (p-value)	0.193	0.238	0.241	0.137
Hansen J. test for over-identification of instruments	$\chi^2(37) = 39.71$ Prob > $\chi^2 = 0.350$	$\chi^2(41) = 35.39$ Prob > $\chi^2 = 0.717$	$\chi^2(58) = 56.89$ Prob > $\chi^2 = 0.517$	$\chi^2(42) = 39.90$ Prob > $\chi^2 = 0.564$
Difference-in-Hansen tests (p-value): - *GMM instruments for levels* - *IV*	0.207 0.372	0.675 0.509	0.707 0.475	0.582 0.682
Number of instruments	53	58	77	58
Number of groups	114	114	103	115
Unity of the lagged DV coefficient	0.117	0 .123	0.149	0.165

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

4.5.4 Estimation results and discussion

In this section, the estimation results of the four regression models and their economic significance are presented and discussed. Table 4.11 shows the estimation results of Models 14 to 17. Lagged GDPG is positively and statistically significant at the 1% level for Model 17, at the 5% level for Models 14 and 15, and at the 10% level for Model 16. These significant results reiterate, econometrically, the importance of including the lagged dependent variable as a right-hand side variable and economically the dynamics of economic growth in EMDEs.

For capital inflow variables, although the GCI coefficient is not statistically significant, it is positive indicating a positive effect on economic growth. The insignificant result is perhaps overshadowed by the inclusion of the IQ and squared IQ variables, which are both statistically significant. Similarly, FDI shows a positive effect on economic growth. The FDI coefficient is positive and strongly significant at the 1% level for Models 15 and 17 and at the 5% level for Model 16. Based on Model 17, a percentage point increase in FDI as a share of GDP can produce a 0.041 percentage point increase in GDP growth, *ceteris paribus*.

Table 4.11 The SGMM estimation results of Models 14 to 17

	Dependent Variable: GDP Growth Rate			
	(14)	(15)	(16)	(17)
Lagged GDPG	0.117**	0.123**	0.149*	0.165***
	(0.056)	(0.053)	(0.081)	(0.050)
GCI	0.018			
	(0.013)			
FDI		0.043***	0.038**	0.041***
		(0.014)	(0.017)	(0.012)
NONFDI		-0.001		
		(0.012)		
PFE			0.017	
			(0.203)	
PFD			-0.222	
			(0.260)	
OI			-0.033	
			(0.044)	
GDPPC_INT	-0.026***	-0.024***	-0.018***	-0.022***
	(0.005)	(0.004)	(0.005)	(0.007)
GFCF	0.061	0.085**	0.111**	0.068*
	(0.051)	(0.040)	(0.050)	(0.036)
SE	0.078***	0.067***	0.052***	0.057***
	(0.017)	(0.014)	(0.019)	(0.018)
POP	0.002	0.003	0.002	0.004
	(0.004)	(0.003)	(0.004)	(0.003)
IQ	0.025**	0.020***	0.013	0.016*
	(0.011)	(0.008)	(0.010)	(0.008)
IQ-squared	0.019*	0.013	0.004	0.013
	(0.010)	(0.010)	(0.007)	(0.010)
GCI*IQ	-0.044			
	(0.037)			
GCI* IQ-squared	0.031			
	(0.025)			
FDI*IQ		0.047	0.003	0.015
		(0.082)	(0.073)	(0.091)
FDI*IQ-squared		0.254**	0.198**	0.175*
		(0.115)	(0.077)	(0.105)
Constant	0.000	0.000	0.079	0.069
	(0.000)	(0.000)	(0.062)	(0.064)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	356	356	300	377
Number of countries	114	114	103	115

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

The control variables, including GDPPC_INT, GFCF and SE, continue to be statistically significant and display consistent signs for all four models. GFCF is significant at the 5% level for Models 15 and 16 and at the 10% level for Model 17, but insignificant for Model 14. Nevertheless, its coefficient is positive for all models as expected. GDPPC_INT and SE are strongly significant at the 1% level with negative and positive coefficients, respectively, for all models. The POP coefficient becomes statistically insignificant but its sign is consistently positive for all four models. These results affirm the importance of these fundamental determinants in driving economic growth as suggested by neoclassical growth model.

The coefficients of the IQ and squared IQ variables are statistically significant at the 5% and 10% levels, respectively, in Model 14. The coefficient of IQ variable is also significant at the 1% level for Model 15 and at the 10% level for Model 17 but insignificant for Model 16. The squared IQ is not statistically significant for Models 15, 16 and 17. However, both the IQ and squared IQ coefficients have positive signs for all four models. Thus, there is some evidence that enhanced institutional quality is associated with higher economic growth. This result adds more evidence to show the importance of institutional quality in supporting economic development (Acemoglu et al., 2003; Acemoglu & Robinson, 2012; Beverelli, Keck, Larch, & Yotov, 2018).

Both the linear and quadratic interaction terms between GCI and the IQ variables are not statistically significant in Model 14. However, the quadratic interaction terms between FDI and the IQ variables are positive at the 5% significance level for Models 15 and 16 and at the 10% level for Model 17 even though the linear interaction variable is insignificant. The coefficients of both the linear and quadratic interaction terms are positive for all three models. The result emphasises that the growth-enhancing impact of capital inflows is amplified by higher institutional quality in the capital-recipient economy. This finding provides additional evidence that the growth-enhancing impact of capital inflows, especially FDI, also works through the institutional quality channel. This agrees with the findings of previous studies (Iamsiraroj, 2016; Kose et al., 2011).

In summary, capital inflows can directly boost economic growth without relying on institutional quality in the capital-recipient economy. However, the growth-enhancing effect of capital inflows is propelled by better governance, specifically better control of corruption, in the host economy.

4.5.5 Robustness check: Additional control variables

Based on the empirical results in section 4.5.4, only FDI, among the different forms of capital inflows, exerts a positive influence on economic growth in the capital-recipient economy; the impact is bolstered by better institutional quality. To further check the sensitivity of the results, we undertake additional regression analyses by including other control variables that potentially impact economic growth in Model 17. The additional control variables, FO, TO, IFR, GC, and TE, sequentially enter the model one by one.

Table 4.12 presents the results of the post-estimation diagnostic tests for the re-estimated models with additional control variables (Models 18 to 22). For the five models, the conditions necessary for the validity of the SGMM estimator are fulfilled. With p-values higher than 10% significance level, the null hypothesis of no second-order serial correlation AR(2) in the residuals cannot be rejected; one of the major conditions is satisfied. Another critical requirement is also established because the Hansen J. test cannot reject the null hypothesis that the instruments employed to estimate the models are exogenous because the p-values are higher than the standard 10% significance level. Therefore, the estimation results can be meaningfully interpreted in economic terms.

Table 4.12 The SGMM post-estimation diagnostic tests of Models 18 to 22

	Model 18	**Model 19**	**Model 20**	**Model 21**	**Model 22**
AR(1) in first differences (p-value)	0.001***	0.001***	0.001**	0.001**	0.000***
AR(2) in first differences (p-value)	0.162	0.114	0.140	0.114	0.388
Hansen J. test for over-identification of instruments	$\chi^2(42)$ = 40.14 Prob > χ^2 = 0.553	$\chi^2(42)$ = 38.11 Prob > χ^2 = 0.642	$\chi^2(41)$ = 39.85 Prob > χ^2 = 0.522	$\chi^2(41)$ = 31.73 Prob > χ^2 = 0.850	$\chi^2(42)$ = 36.11 Prob > χ^2 = 0.726
Difference-in-Hansen tests (p-value): *- GMM instruments for levels* *- IV*	0.479 0.198	0.611 0.883	0.522 0.687	0.807 0.615	0.553 0.619
Number of instruments	59	59	58	58	59
Number of groups	113	114	115	114	112
Unity of the lagged DV coefficient	0.158	0 .181	0.167	0.166	0.186

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

Table 4.13 reports the estimations from Models 18 to 22. The coefficient of FDI is strongly significant at the 1% level for all models except Model 19 where TO is statistically significant at the 10% level. Its sign is positive for all five models. The results affirm that FDI contributes to economic growth in the capital-recipient economy.

Regarding the key control variables, GFCF is significant at the 5% level for Model 18 and the 10% level for Models 20 and 22 but insignificant for Models 19 and 21. Both GDPPC_INT and SE are strongly significant across all five models. Importantly, the coefficients of the three control variables exhibit the expected signs consistently. The POP coefficient is significant at the 5% level for Model 21 and at the 10% level for Model 19 but insignificant for the other three models; its sign is consistently positive for all five models. The results further emphasise that these control variables belong to the model.

Table 4.13 The SGMM estimation results of Models 18 to 22

	Dependent Variable: GDP Growth Rate				
	(18)	(19)	(20)	(21)	(22)
Lagged GDPG	0.158***	0.181***	0.167***	0.166***	0.173***
	(0.051)	(0.058)	(0.053)	(0.055)	(0.052)
FDI	0.042***	0.023	0.041***	0.032***	0.042***
	(0.012)	(0.019)	(0.014)	(0.012)	(0.015)
GDPPC_INT	-0.022***	-0.025***	-0.022***	-0.021***	-0.016***
	(0.007)	(0.007)	(0.006)	(0.005)	(0.005)
GFCF	0.076**	0.032	0.068*	0.054	0.075*
	(0.037)	(0.045)	(0.036)	(0.045)	(0.042)
SE	0.058***	0.063***	0.057***	0.053***	0.036*
	(0.018)	(0.022)	(0.018)	(0.018)	(0.020)
POP	0.004	0.008*	0.004	0.007**	0.001
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
IQ	0.018**	0.025**	0.017**	0.019**	0.020**
	(0.008)	(0.011)	(0.008)	(0.008)	(0.009)
IQ-squared	0.013	0.012	0.013	0.019**	0.023***
	(0.009)	(0.012)	(0.010)	(0.008)	(0.009)
FDI*IQ	0.032	0.058	0.016	0.083	0.007
	(0.096)	(0.088)	(0.090)	(0.085)	(0.114)
FDI*IQ-squared	0.197*	0.179*	0.176*	0.188*	0.169
	(0.113)	(0.104)	(0.106)	(0.103)	(0.135)
FO	-0.000				
	(0.002)				
TO		0.021*			
		(0.012)			
IFR			0.000		
			(0.007)		
GC				0.020**	
				(0.008)	
TE					0.026
					(0.021)
Constant	0.059	0.012	0.000	0.000	0.000
	(0.061)	(0.084)	(0.000)	(0.000)	(0.000)
Time-fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	370	374	377	371	334
Number of countries	113	114	115	114	112

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

The results for IQ and the interaction terms between the FDI and IQ variables are robust and similar to the results of Model 17. The coefficient of the IQ variable is strongly significant at the 5% level and is positive for all five models. The squared IQ variable is significant at the 1% level for Model 22 and at the 5% level for Model 21, but insignificant for the other three models. The linear FDI-IQ interaction term is statistically insignificant. The quadratic FDI-IQ interaction term is positively significant at the 10% level for Models 18 to 21 but insignificant for Model 22. This empirical evidence strengthens the positive association between IQ and economic growth. More importantly, FDI generates not only direct positive impacts on economic growth but also indirect effects that run through the interactions with improved institutional quality in the host economy.

The additional control variables' results show that FO, IFR, and TE are not statistically significant, but GC and TO are both positively significant at the 5% (Model 21) and 10% (Model 19) levels, respectively. The evidence concurs the findings discussed in section 4.4.5. GC and TO are conducive to economic growth in EMDEs.

4.6 Chapter Summary

This chapter provides basic facts and the dynamics of the nexus between capital inflows and GDP growth for a sample of 130 EMDEs. Between 1991 and 2015, there appears to be three waves of capital inflows into EMDEs. Overall, gross capital inflows into EMDEs have been rising, increasing from an average about 4.9% of GDP in the 1990s to around 9.6% of GDP in the last decade. In the last 25 years, among different types of capital inflows, FDI has become the largest contributor to the total capital inflows into EMDEs. Despite several boom-and-bust cycles, there were noticeable co-movements between capital inflows and GDP growth during the study period. In particular, FDI and GDP growth seemed to follow a similar path strictly. The descriptive results suggest a potential link between capital inflows and GDP growth.

Based on the results of the dynamic panel data models using the two-step SGMM method, capital inflows generate a direct positive impact on economic growth. The result is statistically and economically significant. A percentage point increase in gross capital inflows as a percentage of GDP into EMDEs would approximately increase 0.017 percentage points in GDP growth, *ceteris paribus*. The result is consistent with the neoclassical growth model that predicts a positive effect of capital inflows as well as with the findings of some previous studies.

Further investigation unveiled that the composition of capital inflows is important for understanding the impact of capital inflows on economic growth. Among the different forms of capital inflows, only FDI is a driver of economic growth. The result is robust to the inclusion of other forms of capital inflows in the analyses. Thus, this study adds more empirical evidence to the literature by showing that the capital inflow composition matters for economic growth and the growth-enhancing effect of FDI is independent of the other forms of capital inflows.

To check whether the impact of capital inflows on economic growth relies on the absorptive capacity of the capital-recipient economy, further regression analyses examined the roles of financial development and institutional quality. The results show that even though capital inflows do not generate any impact on economic growth through financial development, they do directly drive economic growth. The results indicate that financial development has a non-linear relationship with economic growth. This is broadly consistent with the literature, demonstrating the growth-inducing effects of financial development.

The regression results show that, besides the direct positive effects on economic growth, capital inflows also indirectly drive economic growth through their interactions with institutional quality. Enhanced institutional quality, precisely the control of corruption, is positively associated with higher economic growth and the links between these two variables are non-linear. The results are robust to different specifications and generally parallel the literature in arguing that institutional quality is a crucial determinant of economic performance.

In conclusion, this study finds that capital inflows have a positive effect on economic growth and the growth-enhancing impact is not conditional on the domestic conditions of the capital-recipient economy. However, the results do show that the economies with higher financial development and better institutional quality achieve more growth-enhancing benefits from capital inflows than economies with lower financial development and weaker institutional quality.

Chapter 5

Capital Inflows and Domestic Credit Growth: Empirical Results and Discussion

"Cross-border capital flows, whether pushed by sending countries or pulled by receiving countries, have been a source of financial fragility."

Raghuram Rajan (2018), Former Governor of the Reserve Bank of India

5.1 Introduction

This chapter discusses the empirical results of the capital inflows-domestic credit growth nexus in EMDEs. Section 5.2 reveals the major facts about domestic credit growth dynamics and the potential links between capital inflows and domestic credit growth as well as the descriptive statistics of the other explanatory variables used in the empirical analysis. Section 5.3 discusses the baseline empirical results followed by the analytical results and a discussion of the role of financial development in assessing the capital inflows-domestic credit growth nexus in section 5.4. Section 5.5 presents the empirical results and discusses the role played by institutional quality in mediating the capital inflows-domestic credit growth links. Section 5.6 concludes the chapter.

5.2 Basic Facts and Descriptive Statistics

5.2.1 Basic facts

This section presents some basic facts and descriptive summaries about domestic credit growth and the potential links between capital inflows and domestic credit growth for a sample of 130 EMDEs between 1991 and 2015.

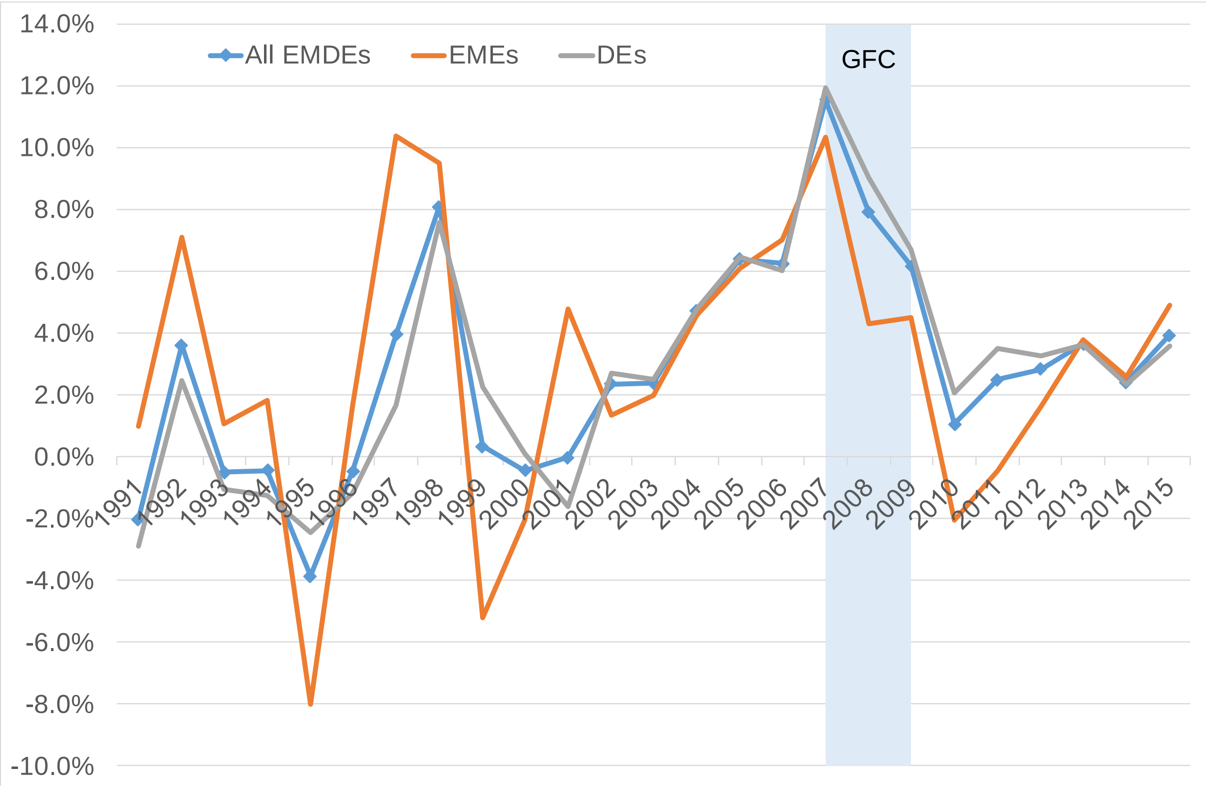
5.2.1.1 Patterns of domestic credit growth

Domestic credit growth (DCG) is an essential macro-financial indicator of an economy, reflecting either economic performance or financial stability. The trends and movements of the real DCG in the study sample from 1991-2015 is shown in Figure 5.1. During the study period, there were several boom-and-bust cycles of DCG in EMDEs. The first episode began with a recorded -2.0% in 1991 and rose to 3.6% in 1992 before plummetting to -3.9% in 1995. The second episode recorded a few years of positive credit growth with a peak of 8.1% in 1998 before declining to -0.4% in 2000. After that, DCG steadily increased to a record rate of 11.6% in 2007. Then, it declined subsequently to a trough of 1.1% in 2010 as the 2008-2009 GFC spread across the world. Following this third episode, DCG was maintained at 3.1% between 2011 and 2015. Over the whole study period, EMDEs generally experienced positive

DCG at an average rate of 2.9% per annum. In particular, after 2011, there seemed to be an expansionary period for EMDEs because they experienced no negative credit growth rates even though the DCG pace slowed after the 2008-2009 GFC.

DCG in EMEs and DEs followed a similar path with several boom-and-bust cycles. During the study period, both EMEs and DEs registered an average real DCG rate of 2.9% per annum. However, EMEs exhibited greater fluctuations in DCG than DEs. This may reflect the fact that DCG is, at least partially, driven by external finance because EMEs are more financially open and thus more exposed to capital flow movements than DEs. Overall, both EMEs and DEs have experienced a relatively unpredictable trend of DCG between 1991 and 2015.

Figure 5.1 Real domestic credit growth rate in EMDEs from 1991 to 2015

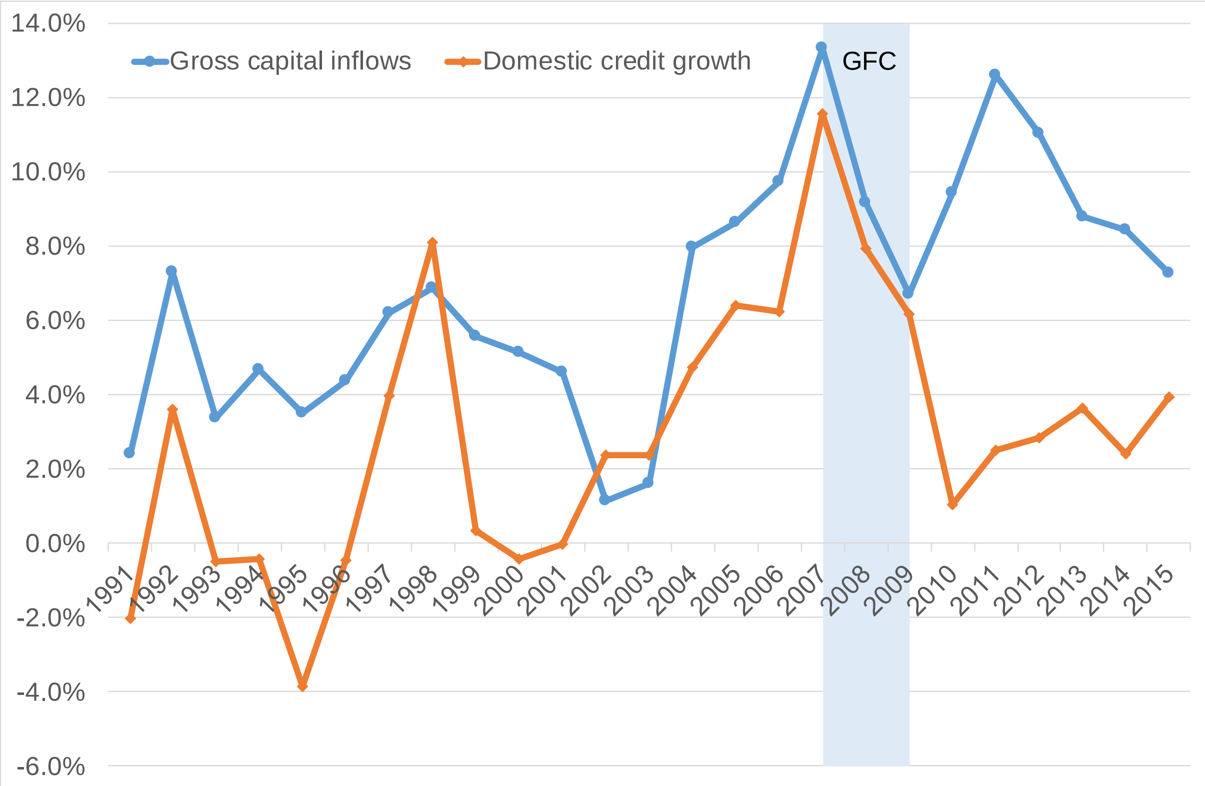


Source: Author's calculations based on data from the WDI database.

5.2.1.2 Potential links between capital inflows and domestic credit growth

Figure 5.2 displays no closely similar path being shared by both gross capital inflows and DCG, but the two variables look likely to experience co-movements during recent decades. They exhibit similar evolution and trends through several boom-and-bust cycles between 1991 and 2015. First, in the 1990s when capital inflows into EMDEs registered a boom-and-bust cycle, reaching a record level of 6.9% of GDP in 1998 before dropping to a trough in 2002, DCG registered a robust growth rate of 8.1% in 1998 before plummeting to -0.4% in 2000. Another cycle was in the 2000s when gross capital inflows recovered and reached a peak of 13.3% of GDP in 2007, and DCG hit a record rate of 11.6% in the same year before the GFC devastated the developing world in 2008-2009. After the GFC, gross capital inflows recovered to an average level of 9.6% of GDP in the 2011-2015 period and DCG registered an average rate of 3.1%.

Figure 5.2 Trends of gross capital inflows and domestic credit growth in EMDEs from 1991 to 2015

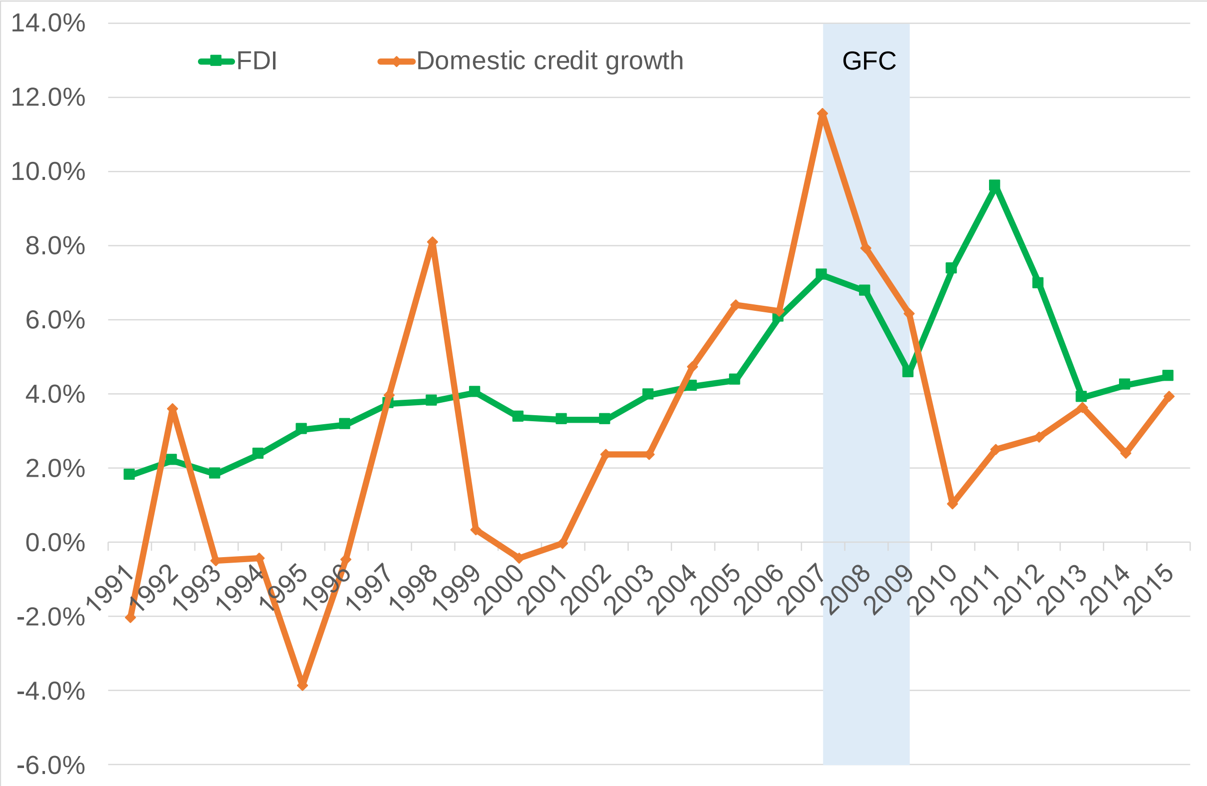


Source: Author's calculations based on data from the IMF BOP and WDI databases.

As FDI was the prime contributor to the total capital inflows into EMDEs from 1991-2015, it is worth examining the movements of FDI and DCG during this period. Figure 5.3 shows that FDI is rising, but DCG exhibits a few cycles of rapid expansion and contraction. During the 1990s, it appears that FDI and DCG were not related at all because while FDI was rising steadily, DCG experienced many years of negative rates. In the 2000s, it is interesting that DCG appeared to share a boom-and-bust cycle with FDI. DCG rose during the years of expanding FDI and decreased during the years of declining FDI.

In summary, although there is no crystal-clear tendency of the same movements between capital inflows and DCG between 1991 and 2015, the two variables seemed to share a few boom-and-bust cycles. Because descriptive data cannot indicate any causal relationship, the links between the two variables could be 'in disguise.' Therefore, the links between capital inflows and DCG deserve further empirical analysis.

Figure 5.3 Trends of FDI and domestic credit growth in EMDEs from 1991 to 2015



Source: Author's calculations based on data from the IMF BOP and WDI databases.

5.2.2 Descriptive statistics of the variables

The descriptive statistics of the five-year average data of DCG, capital inflows and other explanatory variables deployed in the empirical analysis are reported in Table 5.1. The average DCG over the study period 1991-2015 was 2.9% but varied dramatically between -96.7% and 74.6%. The great variations in the DCG in the sample EMDEs indicates that DCG experienced boom-and-bust cycles and could be affected by significant external or internal economic factors. During the same period, gross capital inflows as a percentage of GDP averaged 6.2% and fluctuated between -662.5% and 163.7%. The capital inflow data also exhibit high volatility, which may be because of changes in worldwide factors such as global liquidity and monetary policy stances in advanced economies. Based on the disaggregated levels of capital inflows, the average FDI as a share of GDP was 4.5% whereas the NONFDI inflows as a share of GDP averaged 1.5% over the sample period. The NONFDI inflows were further disaggregated. OI inflows as a share of GDP registered an average of 1.9% whereas the average PFE and PFD inflows were 0.2% and 0.5% of GDP, respectively.

FD, measured as credit provision to the private sector by banks as a share of GDP, recorded an average of 31.3% over the sample period, reflecting the low level of financial sector development in EMDEs. Broad money (BM), measured as broad money supply as a percentage of GDP, averaged 47.0%. Trade openness (TO), measured as the sum of imports and exports as a share of GDP, averaged 80.9%, indicating the growing trade integration between the EMDEs and the rest of the world or the increasing openness of EMDEs to the outside world. Most EMDEs implemented a fixed exchange rate regime (ERR), as measured by the Ilzetzki et al. (2017) classification, with an average value of 2.097 (between 1 (peg regime) and 6 (freely floating regime)) over the study period.

Table 5.1 Summary statistics of the variables used in the CIF-DCG model from 1991 to 2015

Variable	Obs	Mean	Std.Dev.	Min	Max
DCG	565	0.029	0.109	-0.967	0.746
GCI	556	0.062	0.314	-6.625	1.637
FDI	603	0.045	0.083	-0.059	1.606
NONFDI	556	0.015	0.297	-6.653	1.379
PFE	466	0.002	0.011	-0.044	0.164
PFD	490	0.005	0.011	-0.064	0.076
OI	604	0.019	0.107	-1.388	1.619
FD	626	0.313	0.239	0.002	1.429
BM	626	0.470	0.308	0.016	2.503
TO	626	0.809	0.346	0.002	2.410
ERR	645	2.099	1.085	1.000	5.400
GDPPC_INT	629	7.810	1.208	5.089	11.179
GDPG	645	0.019	0.038	-0.245	0.213
IFR	642	0.462	3.196	-0.064	65.171
CNER	634	0.113	0.377	-0.133	6.507
IQ	650	-0.347	0.679	-1.648	1.572
FO	616	-0.111	1.402	-1.904	2.374
GC	572	-1.954	0.388	-3.185	-0.760
GS	524	0.198	0.116	-0.226	0.983
DIR	559	0.158	0.948	0.003	21.989
LIR	540	0.229	0.444	0.042	6.611

Source: Author's calculations based on data from various databases.

Natural logarithms were applied to the initial-period per capita GDP, measured in constant 2010 US$ prices, to reduce the skewness of the variable. The average GDPPC_INT is 7.8 with a relatively high standard deviation of 1.2, reflecting the diverse economic development levels of the 130 economies in the sample. With a considerable variety of economic progress, the average real GDP growth rate (GDPG) in the sample was 1.9% per annum. During the sample period, the inflation rate (IFR) averaged 46.2% whereas the change in the nominal exchange rate (CNER) averaged 11.3%.

The IQ is proxied by the corruption control index from the WGI database with index scores ranging from -2.5 (weak performance) to 2.5 (best performance). This variable averaged -0.35, reflecting poor performance in the control of corruption in EMDEs. EMDEs are less open, in terms of the de jure FO, measured by the 2017 version of the Chinn-Ito index, averaging -0.11 against the range between -1.90 (most restrictive) and 2.37 (least restrictive). Government consumption (GC), measured as the total government spending as a percentage of GDP, averaged -1.954 in natural logarithms, indicating the low level of government spending in EMDEs, especially low-income DEs. Gross savings (GS) minus gold as a share of GDP was 19.8% on average with a broad spectrum between -22.6% and 98.3%. Deposit (DIR) and lending (LIR) interest rates recorded averages of 15.8% and 22.9%, respectively, during the sample period.

5.3 Baseline Empirical Analysis

5.3.1 Introduction

Empirical investigation of the relationship between capital inflows and DCG was undertaken at both aggregated and disaggregated levels of capital inflows. As discussed in section 2.5, the composition of capital inflows potentially matters for DCG. Different types of capital inflows could have distinct influences on DCG. The granular analysis provides more insightful evidence for policymaking concerning capital flow management in EMDEs.

We first estimate the regression model (equation 5.1) that evaluates the impact of capital inflows at an aggregate level (i.e., gross capital inflows) on DCG. Next, the capital inflows impacts are analysed at disaggregated levels by decomposing gross capital inflows into FDI and NONFDI inflows (equation 5.2); the NONFDI inflows are further decomposed into PFE, PFD and OI inflows (equation 5.3). The variables' measures are discussed in section 3.4.3 and their definitions are provided in Table B.2 (see Appendix B). With the same set of control variables, the following specifications are estimated:

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda GCI_{it} + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \tag{5.1}$$

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \lambda_2 NONFDI_{it} + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \tag{5.2}$$

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \lambda_3 PFE_{it} + \lambda_4 PFD_{it} + \lambda_5 OI_{it} + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \tag{5.3}$$

5.3.2 Pearson pairwise correlation

To begin the empirical analysis, the simple correlation between the variables used in the empirical models were examined using the Pearson pairwise correlation approach. The purpose of correlation examination among the pairs of variables is two-fold. The first purpose is to check the direction and strength of the relationships between the variables, especially the relationships between the main independent variables (i.e., CIF variables) and dependent variable (i.e., DCG). The second purpose is to conduct a first look at the data whether there may be a multicollinearity problem, i.e., if the correlation between the variables is perfect or nearly perfect.

The Pearson pairwise correlation matrix between variables is presented in Table 5.2. Based on the correlation coefficients, DCG has weak relationships with all other variables observed but is significantly associated with ERR, GDPG, IFR and CNER. In relation to the important independent variables, GCI and its different components, DCG shows weak relationships since the correlation coefficients are very small, ranging from -0.014 to 0.055, and statistically insignificant.

Similarly, besides the strong relationships with their components such as NONFDI, GCI has a weak relationship with all the observed variables. GCI is positively and significantly correlated with only BM, TO, and GDPG. In contrast, FDI is significantly correlated with almost all variables, except for NONFDI, OI, IFR and CNER. However, the correlations are generally weak. Noticeably, the correlation between FDI and PFE is quite strong since the correlation coefficient of the pair is 0.727 and statistically significant at the 1% level. This strong correlation may not pose a multicollinearity problem because the coefficient estimate is less than the rule-of-thumb value of 0.8, where a problem is suspected (Gujarati & Porter, 2009; Salkind, 2017).

Apart from significantly correlated with its components such as PFE, PFD, and OI, NONFDI is not significantly correlated with any other variable. PFE and PFD are significantly correlated with one another, but the relationship is very weak. They are both correlated significantly with only FD, BM, GDPPC_INT and IQ. OI is significantly correlated with PFD, FD, ERR, GDPPC_INT, and IQ although the relationships are generally quite weak.

Among the correlations between the other observed variables, the correlation between FD and BM is quite strong and significant at the 1% level. This significant, robust relationship is understandable because BM includes the currency in circulation and deposits in the banking system, which are the sources of credit supply in the economy. The credit provided to the private sector by banks as a percentage of GDP acts as the FD variable in this study. However, correlation of the two variables may not create a multicollinearity problem because the pair’s correlation coefficient is 0.794, which is smaller than the cut-off value of 0.8, where a problem is anticipated. More importantly, if there is any multicollinearity problem, the critical assumptions of the estimator used to estimate the models would be violated. It is vitally important to note that all critical assumptions of the SGMM estimator used to estimate the models are satisfied as presented in section 5.3.4 on post-estimation diagnostic tests.

In summary, DCG has weak relationships with all the observed variables but does not have any significant relationship with CIF variables. Among the pairs of variables observed, there are generally weak relationships, thereby posing no concerns of multicollinearity. More importantly, even though DCG appears not to be correlated with CIF variables, the relationship could be misguided because the correlation analysis cannot detect causality between the variables. Therefore, the CIF-DCG relationship should be scrutinised by further empirical analysis.

Table 5.2 Correlation matrix of the variables used in the CIF-DCG model

	DCG	GCI	FDI	NONFDI	PFE	PFD	OI	FD	BM	TO	ERR	GDPPC_INT	GDPG	IFR	CNER	IQ
DCG	1															
GCI	0.028	1														
FDI	0.055	0.317***	1													
NONFDI	0.017	0.961***	0.047	1												
PFE	0.003	0.568***	0.727***	0.158***	1											
PFD	-0.014	0.263***	0.130***	0.262***	0.116**	1										
OI	0.039	0.159***	0.021	0.154***	0.042	0.206***	1									
FD	-0.033	0.063	0.217***	0.006	0.244***	0.193***	0.072*	1								
BM	0.017	0.084*	0.197***	0.033	0.189***	0.154***	0.066	0.794***	1							
TO	0.052	0.107**	0.252***	0.040	0.044	0.041	0.066	0.346***	0.321***	1						
ERR	-0.154***	-0.022	-0.097**	0.003	0.012	-0.051	-0.085**	-0.268***	-0.237***	-0.236***	1					
GDPPC_INT	-0.039	-0.007	0.113***	-0.038	0.131***	0.262***	0.082**	0.497***	0.434***	0.303***	-0.173***	1				
GDPG	0.180***	0.074*	0.117***	0.044	0.035	0.047	0.060	0.109***	0.047	0.036	-0.254***	-0.061	1			
IFR	-0.168***	-0.004	-0.027	0.002	-0.010	-0.043	-0.005	-0.096**	-0.078*	-0.026	0.294***	-0.048	-0.310***	1		
CNER	-0.203***	-0.024	-0.050	-0.011	0.006	-0.065	-0.049	-0.199***	-0.184***	-0.076*	0.429***	-0.128***	-0.210***	0.562***	1	
IQ	-0.023	-0.018	0.140***	-0.057	0.143***	0.179***	0.105***	0.457***	0.374***	0.265***	-0.231***	0.599***	0.079**	-0.128***	-0.185***	1

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

5.3.3 Diagnostic tests before the SGMM estimation

This section discusses the results of the major diagnostic tests before the proposed dynamic panel data models (equations 5.1 to 5.3) are estimated by the SGMM estimator. It is worth noting that the SGMM estimator is devised to address endogeneity issues in empirical research, particularly in economic and financial disciplines. In addition, the SGMM estimator is more competent than OLS or FE estimators in terms of the estimation efficiency under conditions of heteroscedasticity and autocorrelation (Wooldridge, 2001, 2010). This section illustrates the results of the statistical tests for the presence of endogenous regressors, heteroscedasticity, and autocorrelation in the models.

The Durbin-Wu-Hausman test tests for endogeneity with the null hypothesis that all model regressors can be treated as exogenous. The DWH test statistic follows the Chi-squared (χ^2) distribution and the degrees of freedom equal the number of suspected endogenous regressors. In Models 23 to 25 (equations 5.1 to 5.3), all independent variables, the lagged DCG, GCI, FDI, NONFDI, PFE, PFD, OI, FD, BM, ERR, TO, GDPPC_INT, GDPG, IFR and CNER, are possibly endogenous. These independent variables are treated as endogenous in the tests. To perform the DWH test, the three models are estimated by the 2SLS estimator using one-year lagged differences of the potentially endogenous variables as instruments following Wintoki et al. (2012). The results in Table 5.3 show that the null hypothesis that these endogenous regressors can be treated as exogenous is rejected at the 1% significance level for all models. The test results indicate there are endogenous variables in the model, reiterating the reason to use SGMM estimator in estimating the models.

Table 5.3 Diagnostic test results before the SGMM estimation of Models 23 to 26

	Model 23	**Model 24**	**Model 25**	**Model 26**
Durbin-Wu-Hausman test (Null hypothesis: Right-hand side variables as a group are exogenous.)				
Test statistic	χ^2 (10) = 54.83	χ^2 (11) = 55.13	χ^2 (13) = 48.29	χ^2 (10) = 50.10
p-value	0.000***	0.000***	0.000***	0.000**
Modified Wald test (Null hypothesis: Homoscedasticity)				
Test statistic	χ^2(118) = 4.6x10^6	χ^2 (118) = 3.4x10^7	χ^2 (105) = 2.5x10^5	χ^2 (120) = 5.0x10^5
p-value	0.000***	0.000***	0.000***	0.000***
Wooldridge test (Null hypothesis: No autocorrelation)				
Test statistic	F(1, 88) = 22.34	F(1, 88) = 23.57	F(1, 63) = 12.29	F(1, 99) = 23.48
p-value	0.000***	0.000***	0.000***	0.000***

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

To test for heteroscedasticity in the three models (equations 5.1 to 5.3), the Modified Wald test is used because this test is appropriate for panel data (Baum, 2001). The MW test follows the Chi-squared (χ^2)

distribution with the null hypothesis that there is no group heteroscedasticity in the residuals. The MW test is carried out using the FE estimator to estimate the three models (equations 5.1 to 5.3); the residuals are checked to see if group heteroscedasticity is present. The MW test results presented in Table 5.3 strongly reject the null hypothesis that there is no group heteroscedasticity in the residuals for all models at the 1% significance level. To check for autocorrelation in the three models, the Wooldridge (2002) test is used because it is appropriate for linear panel data models (Drukker, 2003). Table 5.3 shows that the null hypothesis of no serial correlation in the residuals is rejected for all the three models at the 1% significance level. The results of these statistical tests reinforce the justification for using the SGMM estimator in the three dynamic panel data models (equations 5.1 to 5.3).

5.3.4 Post-estimation diagnostic tests

Table 5.4 shows the diagnostic test results of the estimated Models 23 to 25 (equations 5.1 to 5.3) that evaluate the impacts of GCI and its different components on DCG. Roodman (2009a, 2009b) provided a detailed discussion of the conditions under which the estimation of a dynamic panel data model using the SGMM estimator can be authentically inferred. In brief, five criteria must be fulfilled to ensure that the estimation results are not spurious. First, the SGMM estimator entails no second-order serial correlation AR(2) in the residuals (Arellano & Bond, 1991). The p-values of the AR(2) tests for the estimated Models 23 to 25 are 0.632, 0.397, and 0.343 so the null hypothesis of no second-order serial correlation AR(2) cannot be rejected at all conventional significance levels. Hence, one of the necessary conditions is satisfied.

Second, the Hansen J. test for over-identification of instruments is fundamentally the test of the validity of instruments used in estimating the models. With respect to the p-values of 0.775, 0.660, and 0.696 in the Hansen J. test for the Models 23 to 25, the null hypothesis that the instruments are exogenous cannot be rejected at all standard significance levels. The results, thus, show that the instrument sets used in the estimated Models 23 to 25 are correctly identified or valid. Third, the SGMM estimator assumes the null hypothesis that the subsets of instruments (i.e., lagged differences for level equation) are exogenous. This assumption can be directly tested using the Difference-in-Hansen test. Table 5.4 shows the p-values of the three models (Models 23 to 25) cannot pass all the standard significance levels, implying that the null hypothesis cannot be rejected.

Fourth, the SGMM estimator requires a steady-state assumption to check the validity of the instruments. A steady state assumption means that the coefficient of the lagged dependent variable should be less than an absolute value of one. Table 5.4 shows the coefficient of the lagged DCG of the three models is less than one, indicating that the steady-state assumption holds.

Table 5.4 The SGMM post-estimation diagnostic tests of Models 23 to 26

	Model 23	Model 24	Model 25	Model 26
AR(1) in first differences (p-value)	0.000***	0.000***	0.016**	0.000***
AR(2) in first differences (p-value)	0.632	0.397	0.343	0.883
Hansen J. test for over-identification of instruments	$\chi2(12) = 8.13$ Prob > $\chi2 = 0.775$	$\chi2(12) = 9.50$ Prob > $\chi2 = 0.660$	$\chi2(10) = 7.31$ Prob > $\chi2 = 0.696$	$\chi2(13) = 12.66$ Prob > $\chi2 = 0.474$
Difference-in-Hansen tests (p-value) - *GMM instruments for levels* - *IV*	0.713 0.859	0.527 0.844	0.941 0.878	0.423 0.630
Number of instruments	28	29	29	29
Number of groups	118	115	102	118
Unity of the lagged DV coefficient	0.178	0.211	0.537	0.300

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

Finally, as suggested by Roodman (2009a), there should be a report of the number of instruments used in estimating the dynamic panel data model because a high number of instruments can generate weak instruments that could lead to biased estimates. As a rule of thumb, the number of instruments should be less than the number of individual units of the panel. As shown in Table 5.4, the set of instruments used in the three models is less than the number of panel cross-sectional units.

In summary, the post-estimation diagnostic test results show that all necessary assumptions to ensure the validity of the SGMM estimator used to estimate the three dynamic panel data models are satisfied. The diagnostic tests indicate that the estimation results of the three dynamic panel data models are econometrically reliable and can be authentically interpreted. The estimation results and discussion are presented in the next section.

5.3.5 Baseline estimation results and discussion

5.3.5.1 Overall baseline results and discussion

Table 5.5 shows the baseline estimation results. The coefficient of the lagged DCG is positive and statistically significant at the 5% level across the three regression models (Models 23 to 25). These significant results justify the inclusion of the lagged DCG in the dynamic panel data models and confirm the persistence of DCG in EMDEs as indicated in the literature (Furceri et al., 2012; Gozgor, 2014; Igan & Pinheiro, 2011). The results support the dynamic relationship between capital inflows and DCG as suggested by some previous studies (Fendoğlu, 2017; Tovar Mora, Garcia-Escribano, & Vera Martin, 2012). In their empirical exercise, Blanchard, Ostry, Ghosh, and Chamon (2017) also modelled DCG using a dynamic panel data approach for a sample of 19 EMEs although the lagged DCG is statistically insignificant.

The coefficient of GCI (Model 23) is positive and strongly significant at the 1% level, indicating the evidence of the capital inflows' positive impact on DCG in EMDEs. The result is not only statistically significant but also economically significant. If the GCI as a share of GDP is doubled, DCG rises 13.7 percentage points. This is generally consistent with the open-economy theory that the influx of external finance would lead to increased lendable funds in the capital-recipient economy and eventually accelerate domestic credit extension. The finding confirms a general belief as identified in the literature (Duenwald et al., 2005; Hansen & Sulla, 2013; Hegerty, 2009) that foreign capital inflows are a determining factor of DCG. The literature also indicates that external factors, such as foreign capital inflows, are propellers of credit booms – a period of excessive credit growth – in the capital-recipient economy (Arena et al., 2015; Bakker & Gulde, 2010; Elekdag & Wu, 2011; Hernández & Landerretche, 2002). For example, when monetary policies in advanced economies loosen or become more accommodating (e.g., a quantitative easing policy) or global liquidity is higher, domestic credit in EMEs tends to experience a higher growth rate (Bruno & Shin, 2013; Guo & Stepanyan, 2011).

For the impact of capital inflows on DCG at disaggregated levels, the results show that, overall, only FDI inflows are positive and statistically significant across the two specifications (Models 24 and 25). With Model 24, where GCI is decomposed into FDI and NONFDI, the FDI coefficient is positive and statistically significant at the 5% level and the NONFDI coefficient is also positive but statistically insignificant. For Model 25, where GCI is decomposed into four distinctive components, the FDI coefficient is positively significant at the 10% level although its magnitude is significantly larger. The other three types of capital inflows are statistically insignificant. In general, FDI inflows have a positive effect on credit extension in EMDEs.

This result seems to be plausible because the largest share of capital inflows in the sample is FDI. More importantly, the result is consistent with the theoretical proposition of Blanchard et al. (2017), who argued that non-debt inflows are more likely to make the host economy expansionary and thus increase credit growth. The FDI inflows may stimulate domestic economic activity and create business links with local enterprises in the host economy, thereby increasing credit demand and eventually resulting in domestic credit expansion. Also, rising FDI may increase the asset value of households and firms in the host economy, which would be used as collateral to get more loans from banks or other financial institutions (Lane & McQuade, 2014).

Table 5.5 The SGMM estimation results of Models 23 to 26

	Dependent Variable: Domestic Credit Growth			
	(23)	(24)	(25)	(26)
Lagged DCG	0.178**	0.211**	0.537**	0.300***
	(0.086)	(0.091)	(0.222)	(0.105)
GCI	0.137***			
	(0.052)			
FDI		0.414**	0.601*	0.224**
		(0.196)	(0.307)	(0.097)
NONFDI		0.072		
		(0.089)		
PFE			-4.996	
			(3.155)	
PFD			1.464	
			(1.695)	
OI			-0.207	
			(0.366)	
FD	-0.584***	-0.681***	-0.471*	-0.762***
	(0.207)	(0.239)	(0.272)	(0.176)
BM	0.312**	0.375***	0.401**	0.443***
	(0.124)	(0.142)	(0.187)	(0.115)
TO	-0.074	-0.046	-0.171**	-0.168
	(0.076)	(0.057)	(0.069)	(0.103)
ERR	-0.114	-0.118*	-0.039*	-0.143**
	(0.073)	(0.071)	(0.021)	(0.066)
GDPPC_INT	0.027	0.009	0.007	0.052
	(0.048)	(0.036)	(0.029)	(0.044)
GDPG	1.314	1.826	-0.837	0.306
	(0.987)	(1.114)	(1.011)	(1.409)
IFR	1.134**	0.983**	1.132**	1.267*
	(0.505)	(0.491)	(0.523)	(0.646)
CNER	-1.048***	-0.958**	-0.883*	-0.845*
	(0.392)	(0.384)	(0.531)	(0.459)
Constant	0.048	0.000	0.097	0.000
	(0.410)	(0.000)	(0.195)	(0.000)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	380	374	295	400
Number of countries	118	115	102	118

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

The FD coefficient is consistently negative and statistically significant for the three specifications. They are strongly significant at the 1% level for both the aggregate specification (Model 23) and the FDI and NONFDI specification (Model 24), and at the 10% level for the granular specification (Model 25). The results agree with the a priori argument that a well-developed financial system helps restrain the acceleration of credit expansion because it reflects the high level of financial intermediation in the economy. Consequently, the results support the theoretical argument that underlines the vital role of financial system in efficiently intermediating financial resources across space and time in the economy (Levine, 2005). Thus, financial sector development is vitally important in achieving sustained, stable credit growth.

Similarly, the BM coefficient is statistically significant at the 5% level for Models 23 and 25 and at the 1% level for Model 24 and its sign is positive for all three specifications. The coefficient estimate ranges from 0.312 to 0.401. The results are generally consistent with the expectation that a rise in the money supply, translating into higher liquidity in the financial system, increases credit extension. The results emphasise the importance of money supply management in controlling the growth momentum of credit extension in the economy.

The IFR coefficient is statistically significant at the 5% level and positive for all three models. The coefficient estimate ranges between 0.983 and 1.134. The results indicate that increased inflation rate is related to domestic credit expansion. An explanation of this relationship could be that the increased inflation rate is associated with economic expansion that would lead to increased demand for domestic credit. Similarly, the CNER coefficient is strongly significant at the 1% level for Model 23, at the 5% level for Model 24 and at the 10% level for Model 25. It has negative coefficients for all three models. The results show that a positive change in the nominal exchange rate causes a reduction in DCG because a positive change in the nominal exchange rate results in local currency depreciation, which discourages firms and households from borrowing.

The TO coefficient is statistically significant at the 5% level for only the granular model (Model 25). However, the coefficient estimates are negative for all three models. The result suggests little evidence that TO is conducive to restraining the acceleration of domestic lending in the capital-recipient economy. Similarly, the ERR coefficient can barely meet the 10% significance level for Models 24 and 25 but it consistently exhibits negative signs across all three specifications (Models 23 to 25). Lastly, the coefficients of GDPPC_INT and GDPG are statistically insignificant across all three specifications although they generally display positive signs.

5.3.5.2 FDI inflows and domestic credit growth: Results and discussion

Based on the above results, only FDI inflows positively affect DCG; the other three types of capital inflows do not. To check whether the FDI truly affects DCG, a separate dynamic model specification is estimated using the same two-step SGMM estimator. The model includes the same set of control variables and the FDI inflows as the only capital inflow variable; the other three types of capital inflow are excluded. Specifically, the following specification is estimated (equation 5.4). Before Model 26 (equation 5.4) is estimated by the SGMM estimator, statistical tests to check for the presence of endogenous regressors, heteroscedasticity, and autocorrelation in the model are performed (see Table 5.3). The post-estimation diagnostic tests are presented in Table 5.4 and the estimation results are shown in Table 5.5 in conjunction with Models 23 to 25.

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \tag{5.4}$$

The results of the post-estimation diagnostic tests in Table 5.4 show all necessary assumptions to validate the SGMM estimator are fulfilled. The estimation results in Table 5.5 can, therefore, be authentically inferred. The coefficient of FDI inflows remains positive and significant at the 5% level, but it is smaller. The estimation result further confirms that FDI inflows cause DCG in the capital-recipient economy. Similarly, FD and BM continue to be strongly significant at the 1% level and have negative and positive signs, respectively. The results endorse the initial findings that FD plays a vital role in decelerating domestic credit expansion whereas a rise in money supply increases domestic lending. Again, IFR and CNER remain statistically significant at the 10% level with positive and negative signs, respectively. The results further support the earlier finding that IFR and CNER are the determinants of DCG.

Interestingly, the ERR is negatively significant at the 5% level. The result adds evidence to the earlier finding that the ERR has a crucial role in slowing DCG. The results appear to suggest that a more flexible ERR can restrain the acceleration of credit extension, which agrees with the economic argument that, in a flexible regime, capital inflows appreciate domestic currency but do not place any pressure on domestic credit. This finding is broadly commensurate with the literature (Igan & Tan, 2017; Magud et al., 2014), showing that the credit growth of the corporate sector is reduced in an economy with a more flexible ERR. Lastly, the remaining control variables, TO, GDPPC_INT, and GDPG, do not pass any standard significance levels with their coefficients.

5.4 Role of Absorptive Capacity: Financial Development

5.4.1 Introduction

Based on the baseline results discussed in section 5.3, capital inflows have a direct effect on DCG in capital-recipient economy. This finding agrees with the theoretical argument suggesting that external financial inflows would increase lendable funds in the economy and thus result in domestic credit expansion (Arena et al., 2015; Lane & McQuade, 2014). However, this study argues that the absorptive capacity of the capital-recipient economy, such as FD and IQ, may have a role to play in understanding the impacts of capital inflows on DCG. As discussed in section 2.5 (Chapter 2), to the best of our knowledge, there is only one study (Igan & Tan, 2017) that considers FD in analysing the net capital flows-DCG relationship for a sample of 33 developed and emerging economies. No scholarly attention has been paid to the role of IQ in examining the CIF-DCG nexus.

To check whether the CIF-DCG nexus is conditional on the FD level, the baseline GCI-DCG model is re-specified by adding the linear interaction term between GCI and FD (equation 5.5). The baseline results show FDI is the only type of capital inflows that generates a positive impact on DCG. As a robustness test, additional regression analyses are conducted by adding the linear interaction term between FDI and FD into the FDI and NONFDI model (equation 5.6), the granular model (equation 5.7), and the separate FDI model (equation 5.8) where FDI is the only capital inflow variable in the model. With the same set of control variables, the following specifications are estimated using the same two-step SGMM estimator.

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda GCI_{it} + \psi_1 FD_{it} + \omega_1 (GCI_{it} * FD_{it}) + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \quad (5.5)$$

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \lambda_2 NONFDI_{it} + \psi_2 FD_{it} + \omega_2 (FDI_{it} * FD_{it}) + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \quad (5.6)$$

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \lambda_3 PFE_{it} + \lambda_4 PFD_{it} + \lambda_5 OI_{it} + \psi_3 FD_{it} + \omega_3 (FDI_{it} * FD_{it}) + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \quad (5.7)$$

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \psi_4 FD_{it} + \omega_4 (FDI_{it} * FD_{it}) + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \quad (5.8)$$

Notably, the interaction terms between GCI and FD and between FDI and FD follow the same two-step approach adopted in Chapter 4. Specifically, the GCI-FD interaction term is the residual obtained from regressing the GCI and FD multiplication product on GCI and FD. The FDI-FD interaction term is the residual obtained from regressing the FDI and FD multiplication product on FDI and FD.

5.4.2 Post-estimation diagnostic tests

The results of the post-estimation diagnostic tests of the re-specified Models 27 to 30 (equations 5.5 to 5.8) are reported in Table 5.6. Overall, the necessary conditions to ensure the validity of the SGMM estimator are satisfied. First, because the p-values of the AR(2) tests do not pass any conventional significance levels, the null hypothesis of no second-order serial correlation in the residuals cannot be rejected for all four models (Models 27 to 30); the first necessary condition is fulfilled. Second, since the p-values of the Hansen J. tests do not pass any standard significance levels, the null hypothesis stating that the instruments used in the four model estimations are exogenous cannot be rejected.

Third, the Difference-in-Hansen tests also do not yield any p-values that can reject the null hypothesis stating that the subsets of instruments used in estimating the four models are exogenous. Fourth, the number of instruments used is fewer than the number of individual panel units. Finally, the unity of the lagged dependent variable coefficients (i.e., lagged DCG) is also true because the absolute value of the lagged DCG is less than one for all four models. In short, because the important conditions required to make SGMM a valid estimator are satisfied, the estimation results can be meaningfully interpreted.

Table 5.6 The SGMM post-estimation diagnostic tests of Models 27 to 30

	Model 27	**Model 28**	**Model 29**	**Model 30**
AR(1) in first differences (p-value)	0.003***	0.002***	0.026**	0.003***
AR(2) in first differences (p-value)	0.250	0.186	0.246	0.124
Hansen J. test for over-identification of instruments	$\chi2(18)$ = 18.04 Prob > $\chi2$ = 0.453	$\chi2(17)$ = 16.71 Prob > $\chi2$ = 0.474	$\chi2(14)$ = 12.25 Prob > $\chi2$ = 0.586	$\chi2(18)$ = 22.73 Prob > $\chi2$ = 0.201
Difference-in-Hansen tests (p-value) - *GMM instruments for levels* - *IV*	0.547 0.849	0.926 0.838	0.577 0.432	0.243 0.500
Number of instruments	35	35	34	35
Number of groups	115	115	102	118
Unity of the lagged DV coefficient	0.380	0.417	0.366	0.448

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

5.4.3 Estimation results and discussion

Table 5.7 presents the estimation results of Models 27 to 30. Although the lagged DCG is not significant for Model 29, it is strongly significant at the 1% level for the other three models and it has positive coefficients for all models. Similarly, the capital inflows variables continue to be statistically significant and positive; GCI is significant at the 10% level, FDI is strongly significant at the 5% level for the three specifications (Models 28 to 30). The results show the positive impact of capital inflows on DCG in EMDEs. An interesting result emerges from this analysis. PFE is negative and statistically significant at the 5% level (Model 29). This result indicates that an increase in PFE inflows leads to a slower pace of DCG. It is true that a well-developed stock market that can attract equity investment from foreign investors would become a primary source of financing for domestic firms. Thus, the demand for domestic credit would be reduced.

Table 5.7 The SGMM estimation results of Models 27 to 30

	Dependent Variable: Domestic Credit Growth			
	(27)	(28)	(29)	(30)
Lagged DCG	0.380***	0.417***	0.366	0.448***
	(0.136)	(0.134)	(0.250)	(0.124)
GCI	0.084*			
	(0.047)			
FDI		0.339**	0.701**	0.241**
		(0.149)	(0.340)	(0.100)
NONFDI		-0.123		
		(0.139)		
PFE			-4.978**	
			(2.477)	
PFD			0.881	
			(1.795)	
OI			-0.188	
			(0.416)	
FD	-0.475**	-0.580**	-0.429*	-0.678***
	(0.236)	(0.244)	(0.250)	(0.200)
BM	0.268	0.357**	0.322*	0.399***
	(0.164)	(0.163)	(0.182)	(0.147)
TO	-0.096**	-0.119*	-0.131**	-0.152***
	(0.047)	(0.061)	(0.059)	(0.058)
ERR	-0.033**	-0.035*	-0.025	-0.043***
	(0.016)	(0.018)	(0.021)	(0.015)
GDPPC_INT	0.004	0.008	0.010	0.014
	(0.025)	(0.023)	(0.033)	(0.021)
GDPG	-0.008	0.151	0.034	0.187
	(0.610)	(0.550)	(0.613)	(0.569)
IFR	0.673*	0.687*	0.808*	0.553
	(0.409)	(0.410)	(0.456)	(0.429)
CNER	-0.446	-0.451	-0.660	-0.180
	(0.426)	(0.369)	(0.428)	(0.430)
GCI*FD	-0.021			
	(0.185)			
FDI*FD		-0.470	-0.633	-0.300
		(0.362)	(1.310)	(0.310)
Constant	0.000	0.120	0.045	0.119
	(0.000)	(0.181)	(0.230)	(0.159)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	374	374	295	400
Number of countries	115	115	102	118

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

The results for the remaining control variables broadly agree with those of the baseline models. FD and BM remain statistically significant and show consistent coefficient signs. TO becomes statistically significant across all four models whereas ERR is significant for all models, except Model 29; the coefficients of the two variables are consistently negative. The results echo the baseline findings that TO and exchange rate flexibility are associated with a slower pace of DCG. Although the IFR remains significant for Models 27, 28 and 29, but insignificant for Model 30, CNER is insignificant. The coefficients of both variables are negative for all four models. GDPPC_INT and GDPG are statistically insignificant for all four models.

The interaction terms between capital inflows and FD, which are of analytical interest, have statistically insignificant coefficients that are negative for all four specifications (Models 27 to 30). The negative coefficients of the interaction terms imply that FD plays a vital role in reducing the influence of capital inflows in generating DCG. In other words, a sophisticated financial sector in the capital-recipient economy can slow the pace of DCG caused by capital inflows. Despite being statistically insignificant, this finding is similar to that of Igan and Tan (2017) although these authors used the split sample analysis approach rather than the conventional interaction term approach as applied in this study. The split sample analysis method has some severe limitations in demonstrating the heterogeneous effects of the variable of interest, which is FD in this study. First, the split sample approach results in different coefficients for all the right-hand side variables in the model for different sub-samples. Given the heterogeneity of sample countries, different estimations for different sub-samples should be expected. Second, determination of the threshold level of the variable is restrictive because it is subject to the sole judgement of researchers; it is usually set at the mean or median values of the variable of interest. Overall, the split-sample method comes at a cost, including the loss of the predictive power of the model and the sensitivity of results to the choice of cut-off values (Gelman & Park, 2009; Harrell, 2008; Royston, Altman, & Sauerbrei, 2006). Thus, Igan and Tan's (2017) results are less generalisable.

5.5 Role of Absorptive Capacity: Institutional Quality

5.5.1 Introduction

As presented in section 5.4, capital inflows are the driver of DCG in EMDEs and this relationship is unchanged when the interaction term between capital inflows and financial development is factored in. In this section, the role of IQ, another crucial absorptive-capacity factor of the EMDEs, is investigated in evaluating the links between capital inflows and DCG.

Based on the literature (Acemoglu et al., 2003; Faria et al., 2016; Góes, 2016; Rodrik, 2000), IQ is a vital factor in promoting financial stability and fostering economic development. Enhanced institutional quality is expected to slow the pace of DCG. To investigate whether the impact of capital inflows on DCG runs through the IQ channel, further regression analyses are conducted by adding the IQ variable and the linear interaction terms between capital inflows and IQ to the baseline models.

The baseline Model 23 is re-specified by adding the IQ variable and the interaction term between the GCI and IQ variables as additional independent variables (equation 5.9). In the baseline results, only FDI, among the different forms of capital inflows, has a positive effect on DCG. As a robustness check, the IQ variable and the interaction term between the FDI and IQ variables are added as additional right-hand side variable to the FDI and NONFDI model (equation 5.10), the granular model (equation 5.11), and the separate FDI model where other capital inflow types are excluded (equation 5.12). The re-specified models (Models 31 to 34) are estimated by the same two-step SGMM estimator and are in the following forms:

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda GCI_{it} + \varpi_1 IQ_{it} + \varsigma_1 (GCI_{it} * IQ_{it}) + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \tag{5.9}$$

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \lambda_2 NONFDI_{it} + \varpi_2 IQ_{it} + \varsigma_2 (FDI_{it} * IQ_{it}) + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \tag{5.10}$$

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \lambda_3 PFE_{it} + \lambda_4 PFD_{it} + \lambda_5 OI_{it} + \varpi_3 IQ_{it} + \varsigma_3 (FDI_{it} * IQ_{it}) + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \tag{5.11}$$

$$DCG_{it} = \varphi DCG_{i,t-1} + \lambda_1 FDI_{it} + \varpi_4 IQ_{it} + \varsigma_4 (FDI_{it} * IQ_{it}) + \sum_{j=1}^{n} \gamma_j Y_{jit} + \varepsilon_t + \xi_{it} \tag{5.12}$$

Construction of the interaction terms follows the same two-step approach discussed in section 4.4.2 and 4.5.2 (Chapter 4). The first step is the multiplication of CIF and IQ variables (i.e., GCI*IQ, FDI*IQ). Second, the products of the CIF and IQ multiplication are regressed on CIF and IQ variables and the regression residuals are used as the interaction variables in Models 31 to 34. The interaction terms between CIF and IQ are anticipated to have negative signs because the impact of capital inflows in driving DCG could be weakened by improved IQ.

5.5.2 Post-estimation diagnostic tests

Table 5.8 presents the results of the post-estimation diagnostic tests with regard to the necessary conditions to validate the SGMM estimator used to estimate the four dynamic panel data models. First, given the p-values of the AR(2) tests for the four models (Models 31 to 34) are higher than 10% significance level, the null hypothesis of no second-order serial correlation in the residuals (Arellano & Bond, 1991; Roodman, 2009a) cannot be rejected; thus a major condition is satisfied. Second, the null hypothesis of the Hansen J. test that the instruments used in estimating the four models are exogenous cannot be rejected at any standard significance levels because the p-values are well above the 10% level. Third, the null hypothesis that the subsets of instruments used in estimating the models are exogenous cannot be rejected because the p-values of the Difference-in-Hansen tests do not pass any conventional significance levels.

Fourth, as suggested by Roodman (2009a), the number of instruments used in the estimation should be fewer than the number of cross-sectional units of the panel; this necessary condition is satisfied for all four models. Finally, because the absolute value of the lagged DCG coefficient is less than one for all four models, the steady-state assumption of the SGMM estimator suggested by Roodman (2009a, 2009b) holds. In conclusion, all necessary conditions to ensure the validity of the SGMM estimator are fulfilled for all four models; the regression results can be meaningfully interpreted.

Table 5.8 The SGMM post-estimation diagnostic tests of Models 31 to 34

	Model 31	**Model 32**	**Model 33**	**Model 34**
AR(1) in first differences (p-value)	0.000***	0.005***	0.011**	0.001***
AR(2) in first differences (p-value)	0.547	0.216	0.271	0.216
Hansen J. test for over-identification of instruments	$\chi2(21)$ = 19.73 Prob > $\chi2$ = 0.539	$\chi2(19)$ = 20.58 Prob > $\chi2$ = 0.360	$\chi2(13)$ = 12.73 Prob > $\chi2$ = 0.469	$\chi2(18)$ = 24.38 Prob > $\chi2$ = 0.143
Difference-in-Hansen tests (p-value) - *GMM instruments for levels* - *IV*	0.849 0.753	0.429 0.739	0.369 0.332	0.394 0.633
Number of instruments	39	38	34	36
Number of groups	115	115	102	118
Unity of the lagged DV coefficient	0.190	0.377	0.442	0.272

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

5.5.3 Estimation results and discussion

In this section, the results of the four regression models and their economic meanings are presented and discussed in light of the literature. Table 5.9 reports the estimation results of Models 31 to 34. The coefficient of the lagged DCG is positive and significant at the 10% level for Models 31, 32 and 33 and at the 5% level for Model 34. The results, again, support the inclusion of the lagged DCG as a right-hand side variable in the model and reaffirm the dynamic characteristics of DCG in EMDEs. The results also reinforce the evidence of the dynamic relationship between capital inflows and DCG in EMDEs.

Table 5.9 The SGMM estimation results of Models 31 to 34

	Dependent Variable: Domestic Credit Growth			
	(31)	(32)	(33)	(34)
Lagged DCG	0.190*	0.377*	0.442*	0.272**
	(0.098)	(0.201)	(0.226)	(0.127)
GCI	0.028			
	(0.063)			
FDI		0.299***	0.614**	0.237***
		(0.108)	(0.255)	(0.068)
NONFDI		-0.094		
		(0.181)		
PFE			-5.283**	
			(2.541)	
PFD			0.556	
			(2.152)	
OI			-0.177	
			(0.454)	
FD	-0.416**	-0.578**	-0.425**	-0.508**
	(0.170)	(0.260)	(0.215)	(0.208)
BM	0.212*	0.358*	0.303**	0.281**
	(0.111)	(0.184)	(0.154)	(0.124)
TO	-0.078*	-0.103*	-0.127**	-0.118**
	(0.043)	(0.058)	(0.054)	(0.052)
ERR	-0.016	-0.026	-0.031	-0.027*
	(0.017)	(0.019)	(0.023)	(0.016)
GDPPC_INT	-0.001	0.003	0.020	0.007
	(0.031)	(0.028)	(0.030)	(0.024)
GDPG	1.447	0.180	-0.031	-0.107
	(0.995)	(0.555)	(0.639)	(0.503)
IFR	0.558**	0.641	0.937**	0.421
	(0.259)	(0.434)	(0.439)	(0.338)
CNER	-0.589*	-0.373	-0.678*	-0.332
	(0.352)	(0.335)	(0.383)	(0.363)
IQ	0.021	0.018	-0.009	-0.003
	(0.064)	(0.051)	(0.070)	(0.074)
GCI*IQ	-0.063**			
	(0.032)			
FDI*IQ		-0.604**	-0.034	-0.368**
		(0.299)	(0.735)	(0.171)
Constant	0.156	0.141	0.000	0.110
	(0.260)	(0.258)	(0.000)	(0.221)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	374	374	295	400
Number of countries	115	115	102	118

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

Even though the GCI turns out to be statistically insignificant, it is still positive, indicating a positive effect on DCG. The FDI coefficient is positive and strongly significant at the 1% level for Models 32 and

34 and at the 5% level for Model 33. In contrast, PFE is negative and statistically significant at the 5% level (Model 33). This result is similar to that in section 5.4, reflecting the essential role of the stock market in mobilising foreign equity, supplying financial resources to firms and eventually containing the speed of domestic credit extension. Because the majority of the sample economies depends on the banking system and the share of PFE in the sample is much less than the share of FDI in the GCI, the aggregate analysis suggests that capital inflows generally cause DCG. The results underline that disaggregated analysis is vitally important. Different components of capital inflows generate different impacts on DCG and the composition of capital inflows matters for DCG.

The interaction terms between the CIF and IQ variables, which are of the analytical interest, have coefficients that are significant at the 5% level for Models 31, 32 and 34, but insignificant for Model 33. However, the signs are negative for all four models. There is thus some evidence that IQ plays a crucial role in lessening the impact of capital inflows on DCG. As this study uses the control of corruption index as a proxy for IQ, the result could be interpreted explicitly that the pace of domestic credit expansion could be attenuated when the corruption is better controlled, *ceteris paribus*. It is true, to some extent, that many lending applications are approved because the financial institutions' loan officers receive bribes, favours or personal benefits. Personal relationships and connections could be another reason for getting loan applications approved even though the applications do not necessarily meet the lending standards. As exposed by Park (2012), there is robust evidence that corruption is a major driver of bad loans in the financial system. A surge in bank lending and eventually non-performing loans are aggravated by an increase in banks' risk-taking behaviour, especially under the condition of severe corruption (Chen, Jeon, Wang, & Wu, 2015). It is reasonably relevant that poor-performing state-owned enterprises, particularly in developing countries, are full of an abundance of loans that are possibly motivated by either favours or political reasons. For instance, bribery is a determinant of firms' financial access in China (Chen, Liu, & Su, 2013). In summary, the study's findings align with the institutional economic theory that argues for the beneficial role of the institution in strengthening financial stability and improving economic performance. The findings are highly relevant for policymaking with regard to capital flow management, financial stability strengthening and ultimately sustained economic growth.

To estimate the importance of IQ in lessening the impact of capital inflows on DCG, a hypothetical question is: "What is the IQ level that can neutralise the credit growth-inducing effects of capital inflows?" With reference to the regression results (Model 31), the threshold level at which the GCI would be neutralised can be estimated by applying the first derivative to the model and set it to zero. For instance, regarding Column 1, Table 5.9 (Model 31), application of the first derivative yields the following result:

$$\frac{\partial DCG}{\partial GCI} = 0.028 - 0.063 * IQ \tag{5.13}$$

This result indicates that the credit growth-inducing impact of GCI could be neutralised if the IQ reaches a threshold level of 0.44 on the control of corruption index scale. This level of 0.44 on the corruption control index is higher than the average level of 0.0 on the scale that ranges from -2.5 (poor performance) to 2.5 (best performance). Noticeably, the 0.44 threshold level of corruption control index is much higher than the average level of -0.347 in this study sample. The 0.44 threshold level is between the 85th and 90th percentiles of the study sample. This result indicates that to weaken the impact of capital inflows on DCG in the host economy, a robust institution needs to be developed.

The fundamental control variables broadly continue to be significant and exhibit consistent signs. FD is negative and significant at the 5% level for all four models whereas BM is positive and significant at the 5% level for Models 33 and 34 and at the 10% level for Models 31 and 32. IFR and CNER is statistically significant for only Models 31 and 33 and their coefficients continue to have consistent signs, positive and negative, respectively. TO is statistically significant at the 5% level for Models 33 and 34 and at the 10% level for Models 31 and 32 whereas ERR is significant at the 10% level for only Model 34. The coefficients of both TO and ERR remain negative across all models. Lastly, GDPPC_INT and GDPG remain statistically insignificant.

In conclusion, the findings provide a clear manifestation that a positive link exists between capital inflows and DCG in EMDEs. However, the link between the two variables is significantly eased by enhanced institutional quality. The credit-growth inducing impact of capital inflows can be nullified if the country's institutional quality realises a threshold level of around 0.44 based on the -2.5 (poor performance) and 2.5 (best performance) scale.

5.5.4 Robustness check: Additional control variables

Among the different capital inflow components, the regression results show only FDI has a positive effect on DCG and IQ has a vital role in lessening the credit growth-generating impact of capital inflows. Additional regression analyses to check the robustness of the results were conducted. The robustness tests include additional control variables that are potentially relevant for DCG into Model 34, depicting the FDI-DCG nexus. The added control variables are FO, GC, gross national savings (GS), deposit interest rate (DIR) and lending interest rate (LIR). As the added control variables enter the model one by one, there are five new models (Models 35 to 39). The variables' definitions are provided in Table B.2 (see Appendix B).

The results of post-estimation diagnostic tests reported in Table 5.10 show the necessary conditions to ensure the validity of the SGMM estimator are satisfied. For all the five specifications (Models 35 to

39), the null hypothesis of no second-order serial correlation in the residuals cannot be rejected because the p-values of the AR(2) tests are well above the 10% significance level. The Hansen J. tests cannot reject, at any conventional significance levels, the null hypothesis that the sets of instruments used in the five models are correctly identified or valid. The null hypothesis of the exogeneity of the instrument subsets used in estimating the models cannot be rejected because the p-values of the Difference-in-Hansen tests for all models do not pass any standard significance levels. Finally, the number of instruments employed in the five models is fewer than the number of individual units in the panel, and the coefficient on the lagged DCG is below the absolute value of one. In summary, the necessary conditions to make the SGMM estimator valid are fulfilled; the estimation results can be confidently used for inference.

Table 5.10 The SGMM post-estimation diagnostic tests of Models 35 to 39

	Model 35	**Model 36**	**Model 37**	**Model 38**	**Model 39**
AR(1) in first differences (p-value)	0.000***	0.000***	0.000***	0.005***	0.003***
AR(2) in first differences (p-value)	0.270	0.478	0.582	0.397	0.706
Hansen J. test for over-identification of instruments	$\chi2(8)$ = 3.80 Prob > $\chi2$ = 0.875	$\chi2(15)$ = 19.18 Prob > $\chi2$ = 0.206	$\chi2(17)$ = 24.36 Prob > $\chi2$ = 0.110	$\chi2(14)$ = 8.00 Prob > $\chi2$ = 0.890	$\chi2(14)$ = 9.75 Prob > $\chi2$ = 0.781
Difference-in-Hansen tests (p-value) - *GMM instruments for levels* - *IV*	0.990 0.847	0.139 0.515	0.426 0.449	0.738 0.880	0.536 0.550
Number of instruments	27	34	36	33	33
Number of groups	118	110	108	111	108
Unity of the lagged DV coefficient	0.194	0.144	0.183	0.193	0.213

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

The regression results of the additional tests are reported in Table 5.11. The lagged DCG remains positive and significant across the five models (Models 35 to 39), at the 5% level for Models 35 and 39 and at the 10% level for Models 36, 37 and 38. These significant results reaffirm the justification for the inclusion of the lagged DCG in the models and the dynamic characteristics of DCG in EMDEs.

The FDI coefficient continues to be positive and strongly significant across the five specifications. They are statistically significant at the 1% level for Models 38 and 39, at the 5% level for Models 35 and 36, and at the 10% level for Model 37. These robust results further emphasise that a surge in FDI inflows is positively associated with the pace of domestic lending in the capital-recipient economy.

Table 5.11 The SGMM estimation results of Models 35 to 39

	Dependent Variable: Domestic Credit Growth				
	(35)	(36)	(37)	(38)	(39)
Lagged DCG	0.194**	0.144*	0.183*	0.193*	0.213**
	(0.084)	(0.084)	(0.105)	(0.109)	(0.104)
FDI	0.217**	0.193**	0.173*	0.293***	0.265***
	(0.105)	(0.076)	(0.105)	(0.088)	(0.094)
FD	-0.606***	-0.239	-0.389***	-0.536***	-0.506**
	(0.230)	(0.180)	(0.152)	(0.174)	(0.215)
BM	0.355*	0.172*	0.229**	0.327*	0.288
	(0.183)	(0.091)	(0.103)	(0.168)	(0.205)
TO	-0.099	-0.170*	-0.165**	-0.119*	-0.145***
	(0.080)	(0.092)	(0.077)	(0.068)	(0.052)
ERR	-0.015	-0.015	-0.022	-0.065	-0.049
	(0.022)	(0.021)	(0.015)	(0.047)	(0.052)
GDPPC_INT	0.128	0.024	0.018	0.084**	0.079*
	(0.088)	(0.029)	(0.036)	(0.036)	(0.041)
GDPG	0.097	0.834	0.517	0.242	0.012
	(0.920)	(1.252)	(0.373)	(0.375)	(0.391)
IFR	0.394	0.614	0.724	0.811**	0.761**
	(0.320)	(0.420)	(0.579)	(0.351)	(0.310)
CNER	-0.305	-0.556	-0.602	-0.030	-0.150
	(0.520)	(0.452)	(0.673)	(0.312)	(0.340)
IQ	-0.069	-0.015	0.033	-0.091	-0.057
	(0.094)	(0.062)	(0.061)	(0.065)	(0.072)
FDI*IQ	-0.816**	-0.503*	-0.574**	-0.686**	-0.763**
	(0.379)	(0.262)	(0.287)	(0.299)	(0.365)
FO	-0.024*				
	(0.015)				
GC		0.144			
		(0.104)			
GS			0.072		
			(0.133)		
DIR				-0.924*	
				(0.525)	
LIR					-0.305
					(0.195)
Constant	-0.879	0.000	0.041	-0.416	0.000
	(0.706)	(0.000)	(0.276)	(0.319)	(0.000)
Time-fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	400	368	361	361	349
Number of countries	118	110	108	111	108

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

For the interaction term between the FDI and IQ variables, the coefficient is strongly significant with negative signs across all five models. They are statistically significant at the 5% level for Models 35, 37, 38 and 39 and at the 10% level for Model 36. These results confirm the earlier finding that the impacts of capital inflows, specifically FDI, on DCG can be reduced by enhanced institutional quality. When the capital-recipient economy achieves a certain threshold of institutional development, the credit growth-inducing effects of capital inflows will be neutralised, *ceteris paribus*.

In summary, the results of these additional tests are generally consistent with the earlier findings. They are robust to different model specifications. Economically, these results reiterate that a surge in capital inflows is significantly associated with an increase in DCG in the capital-recipient economy. However, this effect can be reduced by improved institutional quality. Drawing from the empirical analysis, the findings are firmly relevant in contemplating the policies and strategies on capital flows and macroeconomic management to promote sustained economic development.

5.6 Chapter Summary

This chapter examines the links between capital inflows and DCG. The empirical analysis begins with the revelation of some basic facts regarding the trends of capital inflows and DCG as well as the possible links of the two variables. During the study period 1991-2015, despite several boom-and-bust cycles, there were conceivable paths shared by capital inflows and DCG, suggesting a potential link between these two variables.

The baseline results obtained from estimating the CIF-DCG dynamic panel data models using the two-step SGMM estimator are deliberated. Based on the results, this study documents the persistence of DCG and the dynamic relationship between capital inflows and DCG in EMDEs. GCI has a positive bearing on DCG. The result is statistically and economically significant. If GCI as a share of GDP doubled, DCG increases by 13.7 percentage points. This is broadly consistent with the open-economy theory that the influx of external finance leads to increased lendable funds in the capital-recipient economy and eventually accelerated domestic credit extension. The composition of capital inflows, however, matters for DCG. Among the four types of capital inflows, FDI positively affects DCG whereas PFE has the opposite effect. The result is robust to various specifications. An explanation is that FDI was the largest contributor to GCI into EMDEs during the sample period. Thus, the aggregate analysis shows that gross capital inflows generally induce DCG.

The chapter also provides further evidence by accounting for the absorptive capacity of the capital-recipient economy in the analysis of the CIF-DCG nexus. The econometric analyses demonstrate that the credit growth-inducing impact of capital inflows remains unchanged when FD is factored in. However, the results show that FD generally helps reduce the pace of DCG. More interestingly, the impact of capital inflows on DCG is curtailed by improved institutional quality in the capital-recipient economy. The credit-growth inducing effects of capital inflows could be neutralised if a country realises a threshold level of around 0.44 institutional quality on the -2.5 (poor performance) and 2.5 (best performance) scale. The results are robust to different model specifications. This finding is broadly consistent with the IMF’s (2013) conclusion that suggests that economies with stronger institutions and policies are more resilient to capital inflow fluctuations.

The chapter’s findings are vitally relevant for policy considerations regarding capital flows and macroeconomic policy management. It is generally recognised that too rapid a rise in credit growth may bring the economy to the brink of overshooting and instability. To prevent or resolve economic overshooting, it is vital to understand the drivers of credit growth and capital inflows are found in this study as the primary driver of credit growth. Financial sector development reduces the overall growth rate of domestic credit. More importantly, the pace of DCG caused by capital inflows can be weakened by institutional development.

Chapter 6

Capital Inflows and Real Exchange Rate: Empirical Results and Discussion

"Borrowing from abroad can boost a country's growth, but also leave it vulnerable to crises."

Andrés Velasco (2018), Dean of the School of Public Policy

London School of Economics and Political Science

6.1 Introduction

This chapter presents the empirical results of the capital inflows-real exchange rate nexus in EMDEs. The chapter begins by presenting the main basic facts and the potential links between capital inflows and real exchange rate in section 6.2, followed by a discussion of the baseline results of the nexus in section 6.3. Section 6.4 presents the results on the role of absorptive capacity in intermediating the capital inflows-real exchange rate nexus. Section 6.5 concludes the chapter.

6.2 Basic Facts and Descriptive Statistics

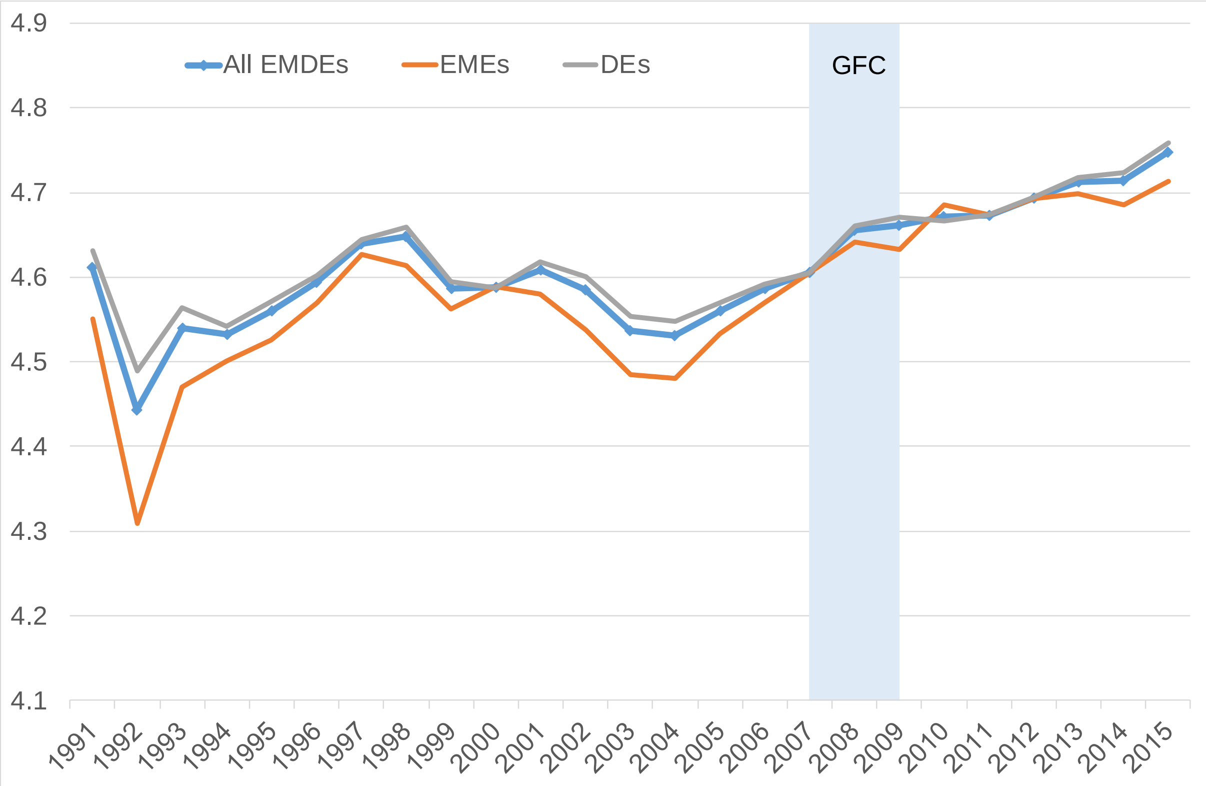
6.2.1 Basic facts

The patterns and evolution of capital inflows are discussed in Chapter 4, so this section presents the basic facts about the RER and the possible links between capital inflows and RER in EMDEs. The section also presents the descriptive statistics of the variables used in the empirical analysis of the study period from 1991 to 2015.

6.2.1.1 Patterns of the real exchange rate

During the sample period 1991-2015, the RER in EMDEs, which is measured by the real effective exchange rate collected from the Bruegel database, is generally appreciating as shown in Figure 6.1. In the past 25 years, the average RER level was recorded at 4.6 in natural logarithms. However, despite some fluctuations in the early 1990s, the RER during the 1991-2000 period on average depreciated by 3.2% per annum. It then depreciated further to a trough in 2004 before rising steadily until the end of the sample period in 2015. Between 2004 and 2015, the RER appreciated by an average rate of 2.3% per annum and the RER during this period was appreciating without interruption in any particular year. An interesting feature in Figure 6.1 is that the RER in EMEs and DEs followed a closely similar path although the RER level in EMDEs is, in general, lower than that of DEs. In summary, EMDEs often experienced RER appreciation, especially in the last decade. This fact seems to reflect that growing economic development in EMDEs in the past decades is accompanied by increasing price levels and thereby RER appreciation.

Figure 6.1 Real effective exchange rate in natural logarithms from 1991 to 2015

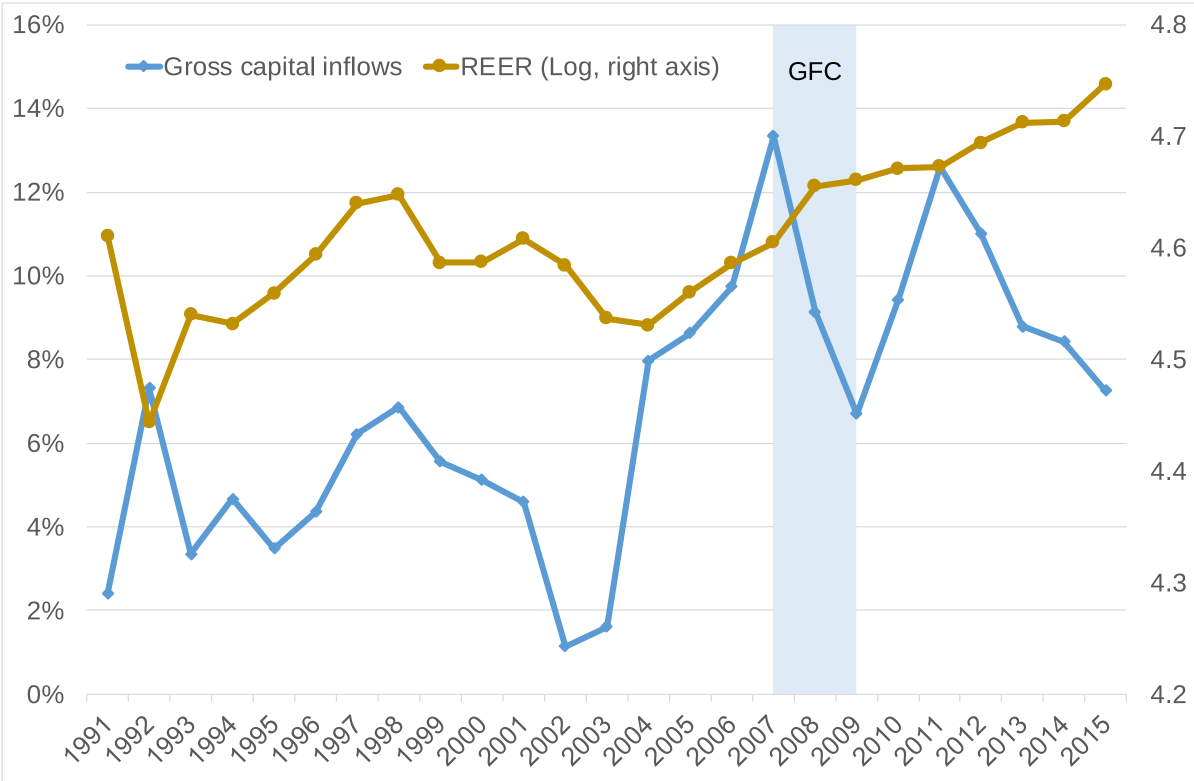


Source: Author's calculations based on data from the Bruegel database.

6.2.1.2 Potential links between capital inflows and the real exchange rate

The evolution and dynamics of GCI and RER in EMDEs can be observed in Figure 6.2. Interestingly, periods of rising GCI are related to RER appreciation and the periods of decreased GCI are associated with RER depreciation. From 1991-1998, when GCI into EMDEs expanded, the RER appreciated significantly. During 1998-2003, when GCI was declining, the RER also depreciated. Despite some fluctuations, the last episode from 2003-2015 saw acceleration of capital inflows into EMDEs and EMDEs appreciated more dramatically than in the previous two periods. In summary, GCI and RER in EMDEs appeared to go hand-in-hand during 1991-2015. They seemed to experience similar boom-and-bust cycles suggesting a dynamic relationship between the two economic variables. The descriptive data analysis indicates links between capital inflows and the RER, but the relationship between the two variables merits further empirical investigation.

Figure 6.2 Trends of gross capital inflows and the REER in EMDEs from 1991 to 2015



Source: Authors' calculations based on data from the IMF BOP and Bruegel databases.

6.2.2 Descriptive statistics of the variables

Table 6.1 reports the descriptive statistics of the RER, capital inflows and other independent variables used in the empirical analysis. The analysis is based on annual data of all variables. Thus, the descriptive statistics of the variables, notably capital inflows variables, are somewhat different from those in the preceding two chapters. As the descriptive statistics of the majority of variables are elaborated in the preceding chapters, this section focuses only on the descriptive data analysis of the most important dependent and independent variables of interest (i.e., the RER and capital inflows).

During 1991-2015, the natural logarithms of RER values varied dramatically from -0.9 to 9.2, with an average of 4.6. The wide disparity of RER values may reflect either different phases of economic development or different economic conditions of the large, diverse sample of EMDEs in this study. Over the sample period, GCI recorded an average value of 7.0% as a share of GDP. The leading contributor to GCI, FDI inflows exhibited an average of 4.5% of GDP. OI inflows contributed an average of 1.9% of GDP, PFE and PFD inflows registered 0.2% and 0.5% of GDP, respectively.

Table 6.1 Summary statistics of the variables used in the CIF-RER model from 1991 to 2015

Variable	Obs	Mean	Std.Dev.	Min	Max
RER	3142	4.612	0.341	-0.961	9.232
GCI	2490	0.070	0.256	-6.625	4.763
FDI	2871	0.045	0.135	-0.454	5.209
NONFDI	2496	0.023	0.206	-6.653	3.302
PFE	2030	0.002	0.023	-0.230	0.782
PFD	2158	0.005	0.020	-0.321	0.195
OI	2886	0.019	0.287	-6.653	4.756
TO	3076	-0.328	0.571	-6.392	1.031
TOT	3123	-0.082	0.424	-3.039	2.513
GDPPC	3203	7.847	1.208	4.963	11.179
GC	2796	-1.967	0.403	-3.889	-0.272
FO	3044	-0.106	1.440	-1.904	2.374
FD	3053	-1.486	0.943	-11.717	0.510
ERR	3225	0.595	0.533	0	1.792
EMS	3001	-0.018	0.158	-1.760	1.659
CNER	3125	0.102	0.423	-0.332	13.45
GGD	2514	0.566	0.419	0	4.549
TRG	2882	0.164	0.158	0	3.020
IFR	3174	0.391	4.816	-0.727	237.731
NODA	2834	-3.773	1.928	-11.697	0.418

Source: Author's calculations based on data from various databases.

6.3 Baseline Empirical Analysis

6.3.1 Introduction

Econometric analysis of the links between capital inflows and the RER begins with the estimation of a parsimonious baseline model as discussed in section 3.5. Capital inflows are the primary independent variable of interest with a set of control variables, including TO, TOT, GDPPC, GC, FO, FD, ERR, EMS and CNER, which are the determinants of RER movements. All variables are in natural logarithms, except for capital inflows (i.e., GCI, FDI, NONFDI, PFE, PFD and OI), FO, EMS, and CNER variables because these variables have negative values. The variables' measures are discussed in section 3.5.3 and their definitions are provided in Table B.3 (see Appendix B).

Empirical investigation of the capital inflows-RER nexus is conducted at both aggregated and disaggregated levels of capital inflows. As discussed in the literature review in section 2.6, the impact of capital inflow composition on the RER is relatively underexplored. Granular analysis is essential to provide more insightful evidence for policymaking in relation to capital flow and macroeconomic policy management in EMDEs.

Against this backdrop, we first estimate the regression model (equation 6.1) that evaluates the GCI impact (i.e., the aggregate level) on the RER. Next, the capital inflow impact is further analysed at disaggregated levels by decomposing GCI into FDI and NONFDI inflows (equation 6.2); the NONFDI inflows are further disaggregated into PFE, PFD and OI inflows (equation 6.3). Specifically, with the same set of control variables, the following specifications are estimated:

$$RER_{it} = \eta RER_{i,t-1} + \sigma GCI_{it} + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \tag{6.1}$$

$$RER_{it} = \eta RER_{i,t-1} + \sigma_1 FDI_{it} + \sigma_2 NONFDI_{it} + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \tag{6.2}$$

$$RER_{it} = \eta RER_{i,t-1} + \sigma_1 FDI_{it} + \sigma_3 PFE_{it} + \sigma_4 PFD_{it} + \sigma_5 OI_{it} + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \tag{6.3}$$

6.3.2 Pearson pairwise correlation

To begin the empirical investigation, simple correlation analysis among the variables in the empirical models is conducted based on the Pearson pairwise correlation approach. Table 6.2 shows the pairwise correlation matrix of the variables. Based on the correlation coefficients, the RER generally has weak relationships with all variables observed. The RER is significantly associated with only PFD, TO, TOT, GDPPC, GC, FD, ERR, and CNER; the other relationships are statistically insignificant. The RER exhibits positive relationships with all capital inflow variables even though it is statistically significant with only PFD. The result indicates that the influx of capital is positively associated with RER appreciation.

GCI has a strong relationship only with its components and weak relationships with the rest of the variables. Interestingly, FDI has a significant and robust tie with PFE; the correlation coefficient is 0.746, which is less than the rule-of-thumb value of 0.8 where the odds of a multicollinearity problem are high. This result implies that PFE moves in tandem with FDI. Perhaps, PFE investors decide to place their investments in economies with vibrant business opportunities as reflected by growing FDI inflows or vice versa. The correlation coefficient of the NONFDI and OI pair is 0.99, making the correlation between the two variables nearly perfect. This strong correlation does not pose a concern for empirical model estimation because the variables are not included in the empirical models at the same time. It is no doubt this strong relationship is because OI is a component of the NONFDI.

Among the other pairs of variables, there is no strong correlation that may pose concern about a multicollinearity problem. In summary, based on the results of the correlation analysis, multicollinearity is unlikely to be an issue in the estimation of the empirical models. Among the different forms of capital inflows, only PFD is significantly and positively correlated with RER appreciation. Since correlation analysis cannot detect causality, the capital inflows-RER nexus warrants further empirical investigation to find out, with confidence, whether capital inflows are a driver of RER appreciation in EMDEs.

Table 6.2 Correlation matrix of the variables used in the CIF-RER model

	RER	GCI	FDI	NONFDI	PFE	PFD	OI	TO	TOT	GDPPC	GC	FO	FD	ERR	EMS	CNER
RER	1															
GCI	0.021	1														
FDI	0.008	0.595***	1													
NONFDI	0.016	0.830***	0.045**	1												
PFE	0.019	0.552***	0.746***	0.086***	1											
PFD	0.067***	0.140***	0.039*	0.158***	-0.001	1										
OI	0.016	0.779***	-0.022	0.990***	-0.051**	0.037*	1									
TO	-0.075***	0.131***	0.128***	0.054***	0.026	0.014	0.028	1								
TOT	-0.080***	-0.026	-0.010	-0.013	-0.023	0.008	-0.011	-0.034*	1							
GDPPC	0.034*	0.080***	0.073***	0.046**	0.073***	0.155***	0.033*	0.282***	0.004	1						
GC	0.038**	0.036*	0.030	0.017	0.007	0.022	-0.003	0.283***	-0.081***	0.318***	1					
FO	0.020	0.097***	0.076***	0.066***	0.039*	0.080***	0.017	0.195***	0.043**	0.334***	0.039**	1				
FD	0.104***	0.102***	0.093***	0.059***	0.100***	0.123***	0.030	0.286***	0.013	0.535***	0.172***	0.213***	1			
ERR	-0.103***	-0.049**	-0.042**	-0.037*	0.014	-0.017	-0.034*	-0.223***	-0.035*	-0.186***	-0.098***	-0.097***	-0.261***	1		
EMS	0.029	-0.008	-0.001	-0.009	-0.003	-0.026	-0.008	0.008	-0.008	0.002	0.013	-0.016	0.064***	-0.045**	1	
CNER	-0.171***	-0.061***	-0.036*	-0.051**	-0.021	-0.032	-0.030	-0.061***	0.039**	-0.113***	-0.063***	-0.138***	-0.227***	0.307***	-0.159***	1

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

6.3.3 Diagnostic tests before the SGMM estimation

As discussed in section 3.5.2, dynamic panel data models of the capital inflows-RER nexus (equations 6.1 to 6.3) may suffer from endogeneity issues. To control for endogeneity, the SGMM estimator is deployed to estimate the models. Before the model estimations are undertaken, the results of statistical tests to provide evidence of potential endogeneity issues in the model are presented. Since the SGMM method is more efficient than the OLS and FE methods in the context of heteroscedasticity and autocorrelation (Wooldridge, 2001, 2010), the results of the heteroscedasticity and autocorrelation tests are also presented.

The DWH test with the null hypothesis that all regressors in the model can be treated as exogenous is conducted to test for endogeneity. The DWH test statistic follows the Chi-squared (χ^2) distribution, and the degrees of freedom equal the number of suspected endogenous regressors. In the proposed capital inflows-RER models, all independent variables, the lagged RER, CIF, TO, TOT, GDPPC, GC, FO, FD, ERR, EMS, and CNER could be endogenous regressors. These independent variables are treated as endogenous in the DWH tests. To carry out the test, the three models (equations 6.1 to 6.3) are estimated using the 2SLS method with the one-year lagged differences of the potentially endogenous regressors used as the instruments. Table 6.3 presents the results of the DWH tests for Models 40 to 42 (equations 6.1 to 6.3). For all three models, the null hypothesis that these regressors can be treated as exogenous is rejected at the 1% significance level. Hence, given this statistical evidence, the results justify the use of the SGMM estimator in estimating the dynamic panel data models (Models 40 to 42).

Table 6.3 Diagnostic test results before the SGMM estimation of Models 40 to 43

	Model 40	**Model 41**	**Model 42**	**Model 43**
Durbin-Wu-Hausman test (Null hypothesis: Right-hand side variables as a group are exogenous.)				
Test statistic	χ^2 (11) = 62.49	χ^2 (12) = 62.60	χ^2 (14) = 66.45	χ^2 (11) = 66.37
p-value	0.000***	0.000***	0.000***	0.000**
Modified Wald test (Null hypothesis: Homoscedasticity)				
Test statistic	χ^2(113) = 8,926.97	χ^2 (113) = 8,926.49	χ^2 (105) = 1.6x10^4	χ^2 (120) = 1.0x10^4
p-value	0.000***	0.000***	0.000***	0.000***
Wooldridge test (Null hypothesis: No autocorrelation)				
Test statistic	F(1, 109) = 55.45	F(1, 109) = 55.46	F(1, 101) = 52.75	F(1, 112) = 57.46
p-value	0.000***	0.000***	0.000***	0.000***

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

To check for the presence of heteroscedasticity, the MW test, which is suited to panel data model (Baum, 2001), is conducted. To implement the MW test, the three models are first estimated by the fixed-effect estimator. Next, the presence of heteroscedasticity in the residuals is checked by using the Chi-squared (χ^2) test. As shown in Table 6.3, for all three models (Models 40 to 42), the null hypothesis of no group heteroscedasticity in the residuals is rejected at the 1% significance level. Regarding autocorrelation, this study uses the Wooldridge (2002) test, which is suited to linear panel data models (Drukker, 2003). Table 6.3 shows that the null hypothesis of no serial correlation in the residuals is rejected at the 1% significance level for all three models (Models 40 to 42).

In conclusion, the results of the statistical tests point out the presence of endogenous regressors as well as heteroscedasticity and autocorrelation in the dynamic panel data models (Models 40 to 42); the results validate the reasoning for using the SGMM estimator in estimating the models.

6.3.4 Post-estimation diagnostic tests

The results of the post-estimation diagnostic tests that are essential for validating the SGMM estimator are presented. Table 6.4 shows the diagnostic test results of the estimated Models 40 to 42 (equations 6.1 to 6.3) that evaluate the impacts of GCI and its different components on the RER.

Table 6.4 The SGMM post-estimation diagnostic tests of Models 40 to 43

	Model 40	**Model 41**	**Model 42**	**Model 43**
AR(1) in first differences (p-value)	0.002***	0.001***	0.094*	0.003***
AR(2) in first differences (p-value)	0.393	0.165	0.203	0.220
Hansen J. test for over-identification of instruments	$\chi2(47) = 49.64$ Prob > $\chi2 = 0.368$	$\chi2(56) = 66.77$ Prob > $\chi2 = 0.154$	$\chi2(38) = 46.95$ Prob > $\chi2 = 0.151$	$\chi2(42) = 49.41$ Prob > $\chi2 = 0.201$
Difference-in-Hansen tests (p-value): - *GMM instruments for levels* - *IV*	0.202 0.209	0.168 0.429	0.191 0.134	0.502 0.241
Number of instruments	84	94	78	79
Number of groups	113	113	108	114
Unity of the lagged DV coefficient	0.765	0.787	0.710	0.703

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

First, the AR(2) tests fail to reject the null hypothesis that there is no second-order serial correlation in the residuals (Arellano & Bond, 1991; Roodman, 2009a) for all three models; a necessary condition of the SGMM estimator is fulfilled. Second, the Hansen J. tests for over-identifying restrictions, which are tests of the internal instrument validity, show that the instrument sets used in all three regressions are exogenous. Third, since the Difference-in-Hansen tests of the three models (Models 40 to 42) yield p-values of higher than the standard 10% significance level, the null hypothesis that subsets of instruments used in estimating the models are exogenous cannot be rejected. Fourth, as suggested by Roodman (2009a), the number of instruments used in the estimation should be fewer than the number of individual units of the panel. The sets of instruments in the three models are fewer than the number of panel cross-sectional units. Finally, since the absolute value of the lagged RER coefficient in the three models is less than one, the steady-state assumption of the SGMM estimator holds (Models 40 to 42). In summary, the results of the post-estimation diagnostic tests indicate that the SGMM estimator used to estimate the three models (Models 40 to 42) is valid because all necessary assumptions are satisfied.

6.3.5 Baseline estimation results and discussion

6.3.5.1 Overall baseline results and discussion

The baseline results of the capital inflows-RER model estimated by the two-step SGMM estimator are presented in Table 6.5; the results are discussed in light of previous studies. Column 1, Table 6.5, shows the results for the link between GCI and RER (Model 40). Column 2 shows the results GCI is disaggregated into FDI and NONFDI inflows (Model 41). Column 3 shows the results when GCI is further disaggregated into FDI, PFE, PFD and OI (Model 42).

The lagged RER coefficient is positive and statistically significant at the 1% level for all three regression models. These significant results justify the insertion of the lagged RER as a right-hand side variable in the dynamic panel data models and confirm the RER persistence in EMDEs. The results thus lend strong support to a dynamic link between capital inflows and the RER. This finding contributes to the limited literature (Combes et al., 2012; Jongwanich & Kohpaiboon, 2013; Lartey, 2007; Saborowski, 2009), on the dynamic characteristics of the RER.

Overall, the results indicate that capital inflows are significantly related to RER appreciation in EMDEs. More substantial capital inflows can induce higher RER appreciation. Model 40 shows that the GCI coefficient is positively significant at the 10% level. Hence, there is evidence, albeit weak, that capital inflows have appreciation impact on the RER. The result yields not only statistical significance but also economic significance. A percentage point rise in the GCI is associated with a RER appreciation of approximately 3.9%. This finding broadly parallels the existing literature (Bakardzhieva et al., 2010; Combes et al., 2012; Jongwanich & Kohpaiboon, 2013).

Further investigation reveals that the capital inflow composition matters. Based on the results of Model 41, only the FDI inflows exerts an appreciation effect on the RER; the NONFDI inflows do not. The coefficient of FDI inflows is significant at the 5% level and the coefficient of NONFDI inflows is insignificant at all standard levels. For Model 42, the coefficient of the FDI inflows is statistically significant at the 10% level whereas the coefficients of the other three types of capital inflows are not significant. The results indicate that only the FDI inflows appreciate the RER in EMDEs; the other forms of capital inflows do not. The appreciation effect of FDI was also found in some of previous studies (Combes et al., 2012; Jongwanich & Kohpaiboon, 2013). However, other studies (Athukorala & Rajapatirana, 2003; Bakardzhieva et al., 2010) did not find any evidence of a link between FDI and the RER. Their results could be because of their sample period that covered mainly the 1980s and 1990s when FDI was more directed towards the tradable or export-oriented sector, thereby putting insignificant pressure on the non-tradable sector. This study's sample period from 1991 to 2015 takes into account the latest developments in cross-border financial flows that have become dramatically more substantial and volatile as shown in section 6.2. Moreover, FDI was the chief contributor to gross capital inflows during the sample period so that its impact may dominate and outshine the other forms of capital inflows. Another possible explanation is that EMDEs are recently more integrated into the world economy and the prices of tradable goods and services are held down with relatively stable international prices. Because of the demand for labour, which need to be drawn from the non-tradable sector, FDI inflows will increase wages and the prices of non-tradable goods and services, resulting in RER appreciation (Obstfeld & Rogoff, 1996).

Among the other control variables in the models, only TO, GDPPC, EMS, and CNER are consistently and statistically significant across the three specifications (Models 40 to 42). The coefficient of TO is strongly significant at the 1% level and is consistently negative for all three models. The results provide strong evidence that TO exerts a depreciation effect on the RER, which is fundamentally consistent with theory. This finding is similar to those of Combes et al. (2012) and Bakardzhieva et al. (2010). GDPPC, which is a proxy for productivity differential, is significant at the 5% level for both Models 40 and 41, but it is insignificant in Model 42. Nevertheless, its coefficient is positive across the three specifications. This result provides empirical evidence to support the economic theory, predicting that improvement in productivity results in RER appreciation. In this sense, the capital-recipient economy's productivity improvement relative to its trading partners leads to the appreciation of its RER.

The EMS coefficient is negatively significant at the 5% level for all three models whereas the CNER coefficient is negatively significant at the 5% level for Model 41 and at the 10% level for Models 40 and 42. These results imply that when the money supply is excessively higher than the money demand in the capital-recipient economy, it generates a depreciation effect. Similarly, a positive increase in the CNER means that the local currency value depreciates against a basket of trading partner currencies, which leads to RER depreciation. In essence, the findings provide robust empirical support to economic theory that predicts the RER depreciation impacts of the EMS and the positive change in the nominal exchange rate.

Table 6.5 The SGMM estimation results of Models 40 to 43

	Dependent Variable: Real Exchange Rate			
	(40)	(41)	(42)	(43)
Lagged RER	0.765***	0.787***	0.710***	0.703***
	(0.094)	(0.082)	(0.096)	(0.123)
GCI	0.039*			
	(0.022)			
FDI		0.036**	0.485*	0.029**
		(0.017)	(0.280)	(0.014)
NONFDI		0.014		
		(0.061)		
PFE			-1.735	
			(1.781)	
PFD			2.623	
			(1.770)	
OI			-0.366	
			(0.474)	
TO	-0.355***	-0.305***	-0.154***	-0.136*
	(0.073)	(0.062)	(0.058)	(0.076)
TOT	0.021	0.050	0.002	0.025
	(0.100)	(0.071)	(0.035)	(0.027)
GDPPC	0.111**	0.101**	0.024	0.105*
	(0.046)	(0.042)	(0.042)	(0.055)
GC	0.072	0.051	-0.016	-0.007
	(0.083)	(0.074)	(0.092)	(0.088)
FO	-0.010	-0.014	0.034	-0.058
	(0.036)	(0.029)	(0.027)	(0.055)
FD	-0.046	-0.031	0.004	0.008
	(0.037)	(0.021)	(0.012)	(0.022)
ERR	0.029	0.035	-0.014	-0.005
	(0.043)	(0.040)	(0.034)	(0.035)
EMS	-0.436**	-0.322**	-0.321**	-0.392***
	(0.192)	(0.146)	(0.143)	(0.143)
CNER	-0.190*	-0.192**	-0.104*	-0.215***
	(0.099)	(0.095)	(0.052)	(0.070)
Constant	0.209	0.132	0.000	0.539
	(0.708)	(0.601)	(0.000)	(0.694)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	2,011	2,011	1,606	2,253
Number of countries	113	113	108	114

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

6.3.5.2 FDI inflows and the real exchange rate: Results and discussion

According to the above estimation results, only FDI inflows exert an appreciation impact on the RER; the other forms of capital inflows do not. To confirm the reliability of the finding, a separate FDI-RER dynamic panel data model is estimated by the same two-step SGMM estimator. With the same set of control variables, the model includes only the FDI inflow variable; the other three forms of capital inflows are excluded. Explicitly, the following specification is estimated (equation 6.4).

$$RER_{it} = \eta RER_{i,t-1} + \sigma_1 FDI_{it} + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \tag{6.4}$$

The results of statistical tests to check for the presence of endogeneity, heterogeneity, and autocorrelation in Model 43 (equation 6.4) are demonstrated with the three models (equations 6.1 to 6.3) in Table 6.3. For Model 43, the post-estimation diagnostic test results and the SGMM estimations are shown in Table 6.4 and 6.5, respectively, along with the three models. Table 6.4 shows all necessary conditions required to ensure the validity of the SGMM estimator are satisfied; the results in Table 6.5 can be meaningfully interpreted. The lagged RER remains positive and strongly significant at the 1% level. This finding agrees with the earlier results, reiterating the persistence of the RER.

The coefficient of FDI continues to be positive and significant at the 5% level. This further confirms that FDI inflows generate RER appreciation effects on the capital-receiving EMDEs. With regard to the control regressors, TO, GDPPC, EMS, and CNER remain statistically significant although the significance levels change somewhat. The coefficients of TO and GDPPC become significant at the 10% level, but their signs remain consistently negative and positive, respectively. Markedly, the coefficients of EMS and CNER become strongly significant at the 1% level and are consistently negative. The other control variables are still statistically insignificant.

In conclusion, a surge in capital inflows is significantly associated with the RER appreciation in the capital-receiving EMDEs. However, the composition of capital inflows matters. Only FDI exerts the appreciation effect on the RER; the other forms of capital inflows do not generate any impact. The other variables, including TO, GDPPC, EMS, and CNER, also affect the RER.

6.4 Role of Absorptive Capacity

6.4.1 Introduction

With reference to the baseline results presented in section 6.3, capital inflows generate an appreciation impact on the RER. With scant study in the literature, this study makes the case that the absorptive capacity of the capital-recipient economy plays a mediating role in the capital inflows-RER nexus. To the best of our knowledge, Saborowski (2009) factors in financial development in analysing the capital flows-RER nexus. However, Saborowski’s (2009) study may suffer from a proliferation of instruments because the total instruments used in the model estimation is much greater than the number of panel units (see warning by Roodman (2009b)). The exchange rate regime is considered in a separate empirical analysis by Combes et al. (2012) using the panel cointegration technique without controlling for the role of financial development. Hence, this study investigates the interactions between capital inflows and FD and between capital inflows and ERR by estimating them together to extract their independent effects. Furthermore, the capital inflow effects on the RER may depend on policy responses of the capital-recipient economy in terms of money supply management. The appreciation effect of capital inflows could be dampened if the central bank of the capital-recipient economy increases the money supply. This study includes the interaction terms between capital inflows and EMS in the models.

To check whether the capital inflows-RER nexus is conditional on the capital-recipient economy's absorptive capacity, including FD, ERR, and EMS, the four baseline models are re-specified to include the interaction terms between capital inflows and FD, ERR, and EMS. Specifically, the four models are re-specified as follows:

$$RER_{it} = \eta RER_{i,t-1} + \sigma GCI_{it} + \rho_1 (GCI_{it} * FD_{it}) + \kappa_1 (GCI_{it} * ERR_{it}) + \vartheta_1 (GCI_{it} * EMS_{it}) + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \quad (6.5)$$

$$RER_{it} = \eta RER_{i,t-1} + \sigma_1 FDI_{it} + \sigma_2 NONFDI_{it} + \rho_2 (FDI_{it} * FD_{it}) + \kappa_2 (FDI_{it} * ERR_{it}) + \vartheta_2 (FDI_{it} * EMS_{it}) + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \quad (6.6)$$

$$RER_{it} = \eta RER_{i,t-1} + \sigma_1 FDI_{it} + \sigma_3 PFE_{it} + \sigma_4 PFD_{it} + \sigma_5 OI_{it} + \rho_3 (FDI_{it} * FD_{it}) + \kappa_3 (FDI_{it} * ERR_{it}) + \vartheta_3 (FDI_{it} * EMS_{it}) + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \quad (6.7)$$

$$RER_{it} = \eta RER_{i,t-1} + \sigma_1 FDI_{it} + \rho_4 (FDI_{it} * FD_{it}) + \kappa_4 (FDI_{it} * ERR_{it}) + \vartheta_4 (FDI_{it} * EMS_{it}) + \sum_{j=1}^{n} \phi_j Z_{jit} + \varepsilon_t + \zeta_{it} \quad (6.8)$$

For the interaction terms, this study adopts the same two-step approach as before. The capital inflows and FD interaction terms are the residuals obtained from regressing the product of capital inflows and FD (i.e., CIF*FD) on capital inflows and FD. The capital inflows and ERR interaction terms are the residuals obtained from regressing the product of capital inflows and ERR (i.e., CIF*ERR) on capital inflows and ERR. Lastly, the capital inflows and EMS interaction terms are the residuals obtained from regressing the product of capital inflows and EMS (i.e., CIF*EMS) on capital inflows and EMS.

6.4.2 Post-estimation diagnostic tests

Table 6.6 presents the results of the diagnostic tests after the SGMM estimation for Models 44 to 47 (equations 6.5 to 6.8). The first necessary condition to ensure the SGMM estimator validity is fulfilled because the AR(2) tests fail to reject the null hypothesis that there is no second-order serial correlation in the residuals for all four models (Models 44 to 47). Second, the Hansen J. tests also fail to reject the null hypothesis that the instruments used in estimating the four models are exogenous since the p-values are well above the standard 10% significance level. The null hypothesis of the exogeneity of the instrument subsets used in estimating the models cannot be rejected at any conventional significance levels because the Difference-in-Hansen tests yield p-values of higher than the 10% significance level; thus, the third condition is satisfied.

Table 6.6 The SGMM post-estimation diagnostic tests of Models 44 to 47

	Model 44	Model 45	Model 46	Model 47
AR(1) in first differences (p-value)	0.001***	0.008***	0.024**	0.008***
AR(2) in first differences (p-value)	0.141	0.132	0.110	0.186
Hansen J. test for over-identification of instruments	$\chi2(68) = 72.85$ Prob > $\chi2 = 0.321$	$\chi2(32) = 35.61$ Prob > $\chi2 = 0.302$	$\chi2(42) = 31.14$ Prob > $\chi2 = 0.891$	$\chi2(34) = 27.41$ Prob > $\chi2 = 0.781$
Difference-in-Hansen tests (p-value): *- GMM instruments for levels* *- IV*	 0.102 0.689	 0.146 0.578	 0.142 0.717	 0.149 0.634
Number of instruments	108	73	85	74
Number of groups	113	113	108	114
Unity of the lagged DV coefficient	0.759	0.918	0.674	0.799

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

As shown in Table 6.6, the fourth condition, which requires the number of instruments used to be fewer than the number of panel units, is also fulfilled. The final assumption about the unified coefficient of the lagged dependent variable is satisfied because the absolute value of the lagged RER coefficient for all four models is less than one. In summary, all necessary conditions to ensure SGMM is a valid estimator for the four dynamic panel data models (Models 44 to 47) are satisfied; thus, the estimation results can be meaningfully interpreted in economic terms.

6.4.3 Estimation results and discussion

Table 6.7 reports the estimation results of the re-specified four models with the interaction terms (equations 6.5 to 6.8). The coefficient of the lagged RER continues to be positively significant at the 1% level across all four models (Models 44 to 47). The results, again, justify the insertion of the lagged RER as the right-hand side variable in the models and endorse the above evidence that the RER in EMDEs is persistent. The current RER level is positively contributed to by the RER realisation in the previous period.

Table 6.7 The SGMM estimation results of Models 44 to 47

	Dependent Variable: Real Exchange Rate			
	(44)	(45)	(46)	(47)
Lagged RER	0.759***	0.918***	0.674***	0.799***
	(0.084)	(0.161)	(0.187)	(0.165)
GCI	0.031			
	(0.020)			
FDI		0.242**	0.155**	0.193**
		(0.095)	(0.075)	(0.082)
NONFDI		-0.008		
		(0.039)		
PFE			-0.604	
			(0.594)	
PFD			0.342	
			(1.159)	
OI			0.014	
			(0.024)	
TO	-0.248***	-0.247**	-0.161	-0.161**
	(0.065)	(0.102)	(0.140)	(0.077)
TOT	0.143*	0.208	0.136	0.018
	(0.085)	(0.158)	(0.155)	(0.032)
GDPPC	0.084**	0.079	0.037	0.143**
	(0.035)	(0.081)	(0.057)	(0.064)
GC	0.051	0.062	0.001	0.047
	(0.072)	(0.112)	(0.055)	(0.108)
FO	-0.010	-0.093**	0.024	-0.085*
	(0.023)	(0.042)	(0.033)	(0.047)
FD	-0.024	-0.002	-0.023	0.001
	(0.027)	(0.038)	(0.030)	(0.047)
ERR	0.037	0.080	0.059	0.037
	(0.040)	(0.053)	(0.045)	(0.047)
EMS	-0.312**	-0.410**	-0.164	-0.379**
	(0.156)	(0.199)	(0.132)	(0.149)
CNER	-0.210**	-0.214**	-0.462***	-0.185**
	(0.088)	(0.092)	(0.163)	(0.090)
GCI*FD	-0.463**			
	(0.233)			
GCI*ERR	0.258**			
	(0.131)			
GCI*EMS	0.577			
	(0.365)			
FDI*FD		-2.169**	-0.979*	-2.133**
		(0.989)	(0.510)	(1.088)
FDI*ERR		0.462	-0.142	0.030
		(0.649)	(0.320)	(0.310)
FDI*EMS		0.270	0.761	0.308
		(2.344)	(1.099)	(2.971)
Constant	0.000	0.000	1.162*	0.000
	(0.000)	(0.000)	(0.670)	(0.000)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	2,011	2,011	1,606	2,253
Number of countries	113	113	108	114

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

The GCI coefficient becomes statistically insignificant (Model 44) although it retains its positive sign. The FDI coefficient is positive and statistically significant at the 5% level for all three specifications (Models 45 to 47) whereas NONFDI in Model 45 and its different components in Model 46 remain statistically insignificant. Given this empirical evidence, the capital inflow composition matters in generating the RER appreciation impact. In EMDEs, FDI inflows trigger RER appreciation. This finding lends further support to the baseline findings in section 6.3. Dao, Minoiu, and Ostry (2017) showed that a RER depreciation increases internal financial resources for the firms because of the reduced real wages thus boosting firms' investments. In line with this reasoning, a RER appreciation causes contrary impacts. Hence, based on our results, the RER appreciation triggered by capital inflows has negative repercussions on the host economy because it can reduce the competitiveness of the tradable sectors and thereby retard domestic investment.

The control regressors, TO, GDPPC, EMS, and CNER, remain statistically significant. TO is strongly significant at the 1% level for Model 44 and at the 5% level for Models 45 and 47, but insignificant for Model 46. GDPPC is statistically significant at the 5% level for Models 44 and 47, but insignificant for Models 45 and 46. However, both TO and GDPPC maintain their negative and positive coefficient signs, respectively, across four specifications. Similarly, EMS is significant at the 5% level for all specifications except Model 46. CNER is significant at the 1% level for Model 46 and at the 5% level for the other three models. Both EMS and CNER coefficients preserve their negative signs for all four models (Models 44 to 47).

The interaction terms between capital inflows and FD are statistically significant for all four specifications (Models 44 to 47). The coefficient of the interaction term between GCI and FD is negatively significant at the 5% level (Model 44). Similarly, the coefficient of the interaction term between FDI inflows and FD is negatively significant at the 5% level in Models 45 and 47 and at the 10% level in Model 46. Based on the results, there is substantial evidence that financial sector development helps dampen the RER appreciation impact caused by the aggregate capital inflows or FDI inflows. Regarding the interaction terms between capital inflows and ERR, only the interaction term between GCI and ERR is positive and significant at the 5% level (Model 44). The result may indicate that there is a positive feedback loop between capital inflows and exchange rate flexibility. In a floating exchange rate regime, a capital inflow surge causes the domestic currency to appreciate; this causal effect attracts more rather than reduce capital inflows into the country, resulting in stronger appreciation of the RER. It is possibly because of this positive feedback loop that foreign exchange interventions are employed by many capital-recipient economies to moderate or stem the RER appreciation pressures caused by capital inflows as shown by a number of studies (Adler & Tovar, 2014; Aizenman & Lee, 2008; Blanchard, Adler, et al., 2015; Gagnon, 2012). Nevertheless, the interaction terms between FDI and ERR are not statistically significant for the three specifications (Models 45 to

47). Therefore, there is little evidence that the ERR is an actor in mediating the RER appreciation impact of capital inflows in EMDEs. Finally, the interaction terms between capital inflows and EMS are not statistically significant for all four specifications (Models 44 to 47).

In conclusion, there is substantial evidence that capital inflows motivate the RER in EMDEs to appreciate. However, FD is a critical factor that can change the trajectory of the links between capital inflows and the RER. This result provides a fundamental insight that the RER appreciation effects of capital inflows can be mitigated by promoting financial sector development. The results are robust for both the aggregate and disaggregated analyses of capital inflows.

6.4.4 Robustness check: Additional control variables

The regression results in section 6.4.3 demonstrate that capital inflows, particularly FDI among the different types of capital inflows, generate RER appreciation effects in EMDEs. However, the appreciation impact is reduced by FD. To confirm the reliability of the findings, a series of additional regression analyses were conducted. The robustness checks are restricted to only the FDI-RER specification (Model 47). The robustness checks are carried out by re-running the FDI-RER regression model with the additional control variables: ratio of government debts to GDP (GGD), the proportion of total reserves minus gold to GDP (TRG), the inflation rate (IFR) and the ratio of net official development assistance to GDP (NODA). The additional control variables are included in the model one at a time. The variables' definitions are provided in Table B.3 (see Appendix B).

Table 6.8 reports the results of the post-estimation diagnostic tests of the four re-run regression models (Models 48 to 51). For all four specifications, the first condition to ensure the SGMM is a valid estimator is satisfied because the AR(2) tests fail to reject the null hypothesis of no second-order serial correlation in the residuals at any conventional significance level. The second condition also holds because the null hypothesis of the Hansen J. tests – the instruments used in the four model estimations are exogenous – cannot be rejected because the tests' p-values are well above the 10% significance level. Because the Difference-in-Hansen tests, at any conventional significance level, fail to reject the null hypothesis that the instrument subsets are exogenous, the third condition is also fulfilled. Since the number of instruments used is fewer than the number of panel cross-sectional units and the absolute value of the lagged RER coefficient is smaller than one for all four models, the fourth and fifth conditions are satisfied. Therefore, the necessary conditions required to ensure the validity of the SGMM estimator are satisfied and, thereby, the estimation results can be meaningfully interpreted.

Table 6.8 The SGMM post-estimation diagnostic tests of Models 48 to 51

	Model 48	Model 49	Model 50	Model 51
AR(1) in first differences (p-value)	0.001***	0.002***	0.015**	0.015**
AR(2) in first differences (p-value)	0.153	0.103	0.237	0.122
Hansen J. test for over-identification of instruments	$\chi 2(26) = 23.57$ Prob > $\chi 2 = 0.601$	$\chi 2(33) = 30.38$ Prob > $\chi 2 = 0.598$	$\chi 2(34) = 31.17$ Prob > $\chi 2 = 0.607$	$\chi 2(25) = 25.81$ Prob > $\chi 2 = 0.418$
Difference-in-Hansen tests (p-value): *- GMM instruments for levels* *- IV*	 0.815 0.601	 0.165 0.465	 0.672 0.633	 0.101 0.429
Number of instruments	67	74	75	66
Number of groups	111	106	114	107
Unity of the lagged DV coefficient	0.831	0.866	0.803	0.840

Note: ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author's estimations.

Table 6.9 reports the estimation results of the robustness tests (Models 48 to 51). For all four specifications, the lagged RER remains positive and strongly significant at the 1% level. The results confirm the justification for inclusion of the lagged RER in the models and the persistent characteristics of the RER in EMDEs. For the FDI, its coefficient remains positive and statistically significant for all four specifications (Models 48 to 51). Specifically, it is significant at the 1% level for Model 48, at the 5% level for Models 49 and 50, and at the 10% level for Model 51. The results further emphasise that an influx of FDI exacerbates the RER appreciation in the capital-receiving EMDEs.

The control regressors, TO, GDPPC, EMS, and CNER, largely retain their statistical significance and coefficient signs. FO becomes negatively significant at the 1% level in Model 49 and at the 5% level in Model 50. The ERR is positively significant in only Model 48. IFR is positively significant at the 10% level (Model 50) but the other three additional control variables, GGD, TRG, and NODA, are statistically insignificant. The result for the IFR is consistent with the economic argument that an increase in inflation rate leads to RER appreciation because the rising inflation rate reflects the higher prices of non-tradable products compared with the prices of tradable products.

The coefficient of the interaction term between the FDI and FD remains statistically significant and negative across all four specifications (Models 48 to 51). It is negative at the 5% significance level for Models 48, 49, and 50, and at the 10% level for Model 51. The results further support the earlier findings that the RER appreciation effect of FDI or capital inflows can be weakened by the improvement in the financial sector.

Table 6.9 The SGMM estimation results of Models 48 to 51

	Dependent Variable: Real Exchange Rate			
	(48)	(49)	(50)	(51)
Lagged RER	0.831***	0.866***	0.803***	0.840***
	(0.085)	(0.136)	(0.122)	(0.144)
FDI	0.059***	0.180**	0.098**	0.232*
	(0.021)	(0.071)	(0.045)	(0.122)
TO	-0.074	-0.158*	-0.188**	-0.238*
	(0.056)	(0.085)	(0.081)	(0.130)
TOT	0.040	0.004	0.018	0.073
	(0.052)	(0.145)	(0.085)	(0.157)
GDPPC	0.009	0.164**	0.101*	0.131
	(0.025)	(0.081)	(0.052)	(0.107)
GC	-0.052	-0.032	-0.076	0.031
	(0.050)	(0.109)	(0.085)	(0.114)
FO	-0.021	-0.101***	-0.077**	-0.018
	(0.024)	(0.038)	(0.035)	(0.061)
FD	-0.014	-0.043	0.003	-0.002
	(0.019)	(0.036)	(0.031)	(0.066)
ERR	0.068***	0.014	0.027	0.056
	(0.024)	(0.047)	(0.034)	(0.051)
EMS	-0.116	-0.297**	-0.114	-0.486***
	(0.092)	(0.144)	(0.116)	(0.185)
CNER	-0.561***	-0.183	-0.486***	-0.162
	(0.125)	(0.117)	(0.148)	(0.101)
FDI*FD	-0.420**	-1.459**	-1.302**	-2.273*
	(0.187)	(0.656)	(0.609)	(1.277)
FDI*ERR	-0.536	-0.314	0.306	0.737
	(0.332)	(0.486)	(0.324)	(0.599)
FDI*EMS	0.482	3.909	-0.371	0.069
	(0.600)	(2.633)	(1.842)	(2.031)
GGD	-0.086			
	(0.054)			
TRG		0.117		
		(0.578)		
IFR			0.059*	
			(0.030)	
NODA				0.039
				(0.036)
Constant	0.567	-0.880	-0.046	-0.212
	(0.495)	(1.086)	(0.780)	(0.967)
Time-fixed effect	Yes	Yes	Yes	Yes
Observations	1,892	2,084	2,241	1,974
Number of countries	111	106	114	107

Note: Robust standard errors are in parentheses. ***, **, * represent significance at 1%, 5%, and 10% levels, respectively.
Source: Author’s estimations.

6.5 Chapter Summary

This chapter empirically investigates the capital inflows-RER nexus in EMDEs. The analysis unveils some basic facts of the evolution of the RER and the potential links between capital inflows and the RER in the sample period from 1991 to 2015. Overall, EMDEs appeared to experience RER appreciation. Despite a few episodes of fluctuations, the RER seemed to appreciate in periods of increasing capital inflows and depreciate in periods of decreasing capital inflows, suggesting an interplay between capital inflows and the RER.

Using the robust two-step SGMM estimator, the baseline estimation results revealed some important findings. First, the results indicate the strong dynamic characteristics of the RER in EMDEs. The current RER is positively contributed to by the RER realisation in the previous period. Second, there is significant evidence that private capital inflows exert an appreciation impact on the RER in EMDEs. From the baseline result, a percentage point rise in capital inflows can trigger a RER appreciation of 3.9%. However, capital inflow composition matters. FDI is the only form of capital inflows that causes the RER to appreciate; the other types of capital inflows (i.e., PFE, PFD and OI) do not.

However, the appreciation effects of capital inflows or FDI inflows are considerably weakened by improvement in the financial sector. When a capital-recipient economy possesses a certain threshold of financial sector development, the appreciation impact of capital inflows, particularly FDI inflows, is neutralised. The results are robust to different specifications and the inclusion of additional control variables. This empirical finding helps reconcile the contradictory conclusions of previous studies. FD is a crucial actor in mitigating the RER appreciation impact of capital inflows. Even though there is little evidence, this study detected a feedback loop between the ERR and capital inflows. That means a more flexible ERR does not stop or reduce foreign capital inflows but, instead, it attracts more capital inflows. In conclusion, the study's findings are principally relevant for designing appropriate strategies or policy measures in managing capital flows and macroeconomic policy.

Chapter 7

Summary and Conclusion

"... there is more we must do to meet the challenges of financial globalization."

Christine Lagarde (2017), Managing Director, International Monetary Fund

7.1 Introduction

Chapter 7 presents an overview of the study, the research findings, policy implications, research limitations and future research avenues. Section 7.2 gives an overview of the study, including the research background, objectives and methodology. Section 7.3 summarises the major findings of the study, and section 7.4 suggests policy implications based on the study's findings. Section 7.5 discusses the study's limitations and section 7.6 concludes the thesis with suggestions for future research.

7.2 Overview of the Study

Cross-border capital flows are one pillar of the evolving economic globalisation that governs the world economy today. Because of several waves of capital account liberalisation across developed and developing countries starting from the mid-1970s, cross-border capital flows have become a new norm. At the global level, gross capital inflows rose from around US$1 trillion in 1990 to about US$12.4 trillion in 2007 before the 2008-2009 GFC devastated the world economy (Lund et al., 2017). Even though the gross capital inflows dropped dramatically after the 2008-2009 GFC, they recovered and reached US$4.3 trillion in 2016 (Lund et al., 2017).

In the decades between 1991 and 2015, cross-border capital flows into EMDEs experienced dramatic surges and fluctuations with several boom-and-bust cycles (IMF, 2016). According to data from the IMF BOP database, gross capital inflows into EMDEs rose steadily from an average of 4.9% of GDP in the 1990s to around 9.6% of GDP in the last decade. Such considerable surges in and variations of cross-border financial flows have extensive ramifications for the capital-receiving countries and their policy responses. This leads to debates on how the benefits of capital flows can be maximised and the costs are minimised for EMDEs.

Studies on the benefits and costs of capital flows continue to be a central area of academic and policy debates because existing evidence lacks robustness and consensus (Agénor & Montiel, 2008; Kose et al., 2011). The impact of capital flows remains an important policy question, especially in developing countries or EMDEs (Jahan & Wang, 2016). Empirical evidence on the growth-enhancing benefits of capital flows can be viewed, at best, as mixed (Eichengreen et al., 2011; Gehringer, 2015; Gente et al., 2015; Kose et al., 2010; Prasad et al., 2007). Capital flow upsurge could be a source of overheating the capital-recipient economy and complicating macroeconomic policymaking (Corden, 1994). Many studies concentrate on the macroeconomic impacts of credit growth or the relationship between credit growth and financial crisis, but the role of capital flows as a primary driver of credit growth has been relatively under-explored. More importantly, the anatomy of the capital flows-credit growth nexus in EMDEs is, to the best of our knowledge, unavailable in the literature. Further, empirical evidence on the RER effects of capital flows is inconclusive. Several studies contend that international capital flows induce RER appreciation (Combes et al., 2012; Elbadawi & Soto, 1994; Jongwanich, 2010; Lartey, 2007) but other studies do not find any evidence (Bakardzhieva et al., 2010).

Against this background, this study empirically examines the impact of capital flows on macroeconomic and financial variables in EMDEs. The research objectives of this study are to investigate: 1) the impact of capital flows on economic growth; 2) the impact of capital flows on domestic credit growth; 3) the impact of capital flows on real exchange rate; 4) the role of domestic economic conditions, focusing on financial sector development, in dealing with the impact of capital flows; and, 5) to derive policy implications of the impacts of capital flows.

This study uses a sample of 130 EMDEs comprising 31 EMEs and 99 DEs between 1991 and 2015, incorporating all regions of the world, thus making it one of the most comprehensive studies. The selection of sample economy and period is dictated by the availability of data. Since a few economies do not have sufficient data for various variables (e.g., capital inflows), the number of sample economies for regression analysis drops to between 102 and 118. Because most EMDEs have FDI data, the sample includes 118 economies. However, fewer EMDEs have PFE and PFD data so the sample decreases to 102 economies. However, the sample remains over 100 economies, which makes this study one of the largest empirical studies. Since there are some missing data for a number of economies during the sample period, the dataset is an unbalanced panel.

To measure capital flows, this study uses gross capital inflows and their different components (i.e., FDI, PFE, PFD and OI) to assess their impacts on economic growth, domestic credit growth, and real exchange rate. These capital inflow variables are measured as their respective (financial) inflows as a share of GDP. As documented in the literature (Araujo et al., 2015; Broner et al., 2013; Gopinath, 2017; Gourinchas & Rey, 2014; Milesi-Ferretti & Tille, 2011; Obstfeld, 2012), gross capital flows provide a better picture of capital flow dynamics than the net capital flows and thereby are more meaningful for empirical analysis.

For the capital inflows-economic growth and capital inflows-domestic credit growth nexuses, this study uses non-overlapping five-year averages of the underlying data between 1991 and 2015 following the standard practice (Chinn & Prasad, 2003; Lane & McQuade, 2014; Reinhardt et al., 2013). During the same sample period, this study follows previous research in using annual data for the capital inflows-real exchange rate nexus. The three focal relationships are empirically modelled using the dynamic panel data model approach to characterise the dynamics of economic growth, domestic credit growth, and real exchange rate. These models are estimated by the robust two-step SGMM estimator developed by Arellano and Bond (1991) and refined by Blundel and Bond (1998).

7.3 Summary of the Research Findings

This section summarises the major findings based on the three principal research objectives of this study: capital inflows-economic growth, capital inflows-domestic credit growth, and capital inflows-real exchange rate nexuses.

7.3.1 Capital inflows–economic growth nexus

The empirical analyses provided some essential results. First, economic growth is characteristically dynamic in EMDEs. Current growth performance is positively contributed to by past growth performance. This finding is broadly consistent with previous studies (Kyaw & Macdonald, 2009; Trabelsi & Cherif, 2017) and supports the dynamic panel data modelling approach.

Second, the results show that capital inflows are strongly and significantly associated with economic growth. A percentage point increase in gross capital inflows as a share of GDP would increase the real GDP growth rate by approximately 0.017 percentage point, *ceteris paribus*. In other words, when the gross capital inflows double, the growth rate of real per capita GDP increases by 1.7 percentage points. This result strongly supports the economic view that foreign capital plays a vital role in directly driving economic growth in the capital-recipient economy (Agénor & Montiel, 2008; Barro et al., 1995; Gourinchas & Jeanne, 2006). Capital inflows are a catalyst in filling saving-investment gap and stimulating investment and economic activity that take the brake off the growth accelerator in the capital-recipient economy.

Third, a more in-depth investigation uncovered that the composition of capital inflows matters for economic growth. After controlling for the other three forms of capital inflows, the results show that only FDI generates a positive impact on economic growth. This finding supports a long-held view that FDI, which is considered long-term foreign investment, is directed mainly towards productive economic sectors that can bring substantial benefits for the host economy in terms of job creation, skill development, managerial expertise and technology transfer (Borensztein et al., 1998; Bosworth et al., 1999; Javorcik, 2004).

Fourth, the results also show that the positive impact of capital inflows on economic growth is not contingent on the level of financial development in the host economy. The results, however, do show that a high level of financial development is positively and significantly associated with economic growth. There is substantial evidence supporting a U-shaped relationship between financial development and economic growth. Financial development at a lower level does not support economic growth; but at a higher level, it becomes a propeller of economic growth. As pointed out by Beck (2011), a hindrance to well-functioning financial intermediation in developing countries, particularly resource-rich countries, is the under-developed banking sector and a small and illiquid stock exchange. Poor-performing financial intermediation does not support economic growth, but better financial intermediation is a driver of economic growth.

Fifth, the growth-enhancing impact of capital inflows is not conditional on the level of institutional quality in the capital-recipient economy. The results, however, reveal that the growth-enhancing effect of capital inflows is boosted by higher institutional quality. In this respect, a capital-recipient economy with higher institutional quality level (e.g., less corruption) can gain higher growth benefits from the capital inflows.

7.3.2 Capital inflows–domestic credit growth nexus

The empirical analysis revealed several important results on the capital inflows-domestic credit growth nexus. First, the result demonstrates the dynamics of domestic credit growth in EMDEs. Past performance positively determines the current performance of domestic credit growth. This finding is generally consistent with previous research (Blanchard et al., 2017; Fendoğlu, 2017; Tovar Mora et al., 2012), lending support to the dynamic panel data modelling of domestic credit growth.

Second, there is substantial evidence that capital inflows are the driver of domestic credit growth. The result is not only statistically significant but also economically significant. When gross capital inflows as a share of GDP double, domestic credit growth rises by 13.7 percentage points, *ceteris paribus*. A sudden surge in capital inflows would accelerate domestic credit growth, generating enormous pressure on price stability in the capital-recipient economy.

Third, the disaggregated analysis showed that the composition of capital inflows matters for domestic credit growth. According to the results, FDI inflows are strongly and significantly associated with domestic credit growth after controlling for the other forms of capital inflows. However, after controlling for the roles of financial development and institutional quality, there is a negative relationship between portfolio equity inflows and domestic credit growth. In other words, an increase in portfolio equity inflows would lead to a slower pace of domestic credit growth provided by the banking sector. The finding aligns with the economic expectation that once the stock market is well developed, it would become a prime source of financing and thus lessen the financing role played by the banking sector.

Fourth, the positive impact of capital inflows or FDI inflows on domestic credit growth do not depend on the level of financial development in the capital-recipient economy. Nevertheless, there is strong empirical evidence that improvement of the financial sector is associated with a slower pace of domestic credit growth. This finding indicates that a well-functioning financial system reflects efficient financial intermediation or financial resource allocation in the economy thereby slowing down the rate of domestic credit growth.

Fifth, there is strong evidence that institutional quality plays a crucial role in weakening the credit growth-inducing impact of capital inflows. The effect of capital inflows in generating domestic credit growth could be attenuated when the capital-recipient economy possesses a very high level of institutional quality; that level is between the 85th and 90th percentile of the study sample. In this sense, the host economy with a potent and robust institution is more resilient to capital inflow movements.

7.3.3 Capital inflows–real exchange rate nexus

The analyses generated some critical findings for the capital inflows-real exchange rate nexus. First, the real exchange rate is inherently persistent. The current real exchange rate is positively influenced by the realisation of the past real exchange rate. This finding further supports the conclusions of previous studies (Combes et al., 2012; Jongwanich & Kohpaiboon, 2013) and thus contributes to consensus building.

Second, capital inflows have a positive relationship with the real exchange rate. Not only is the result statistically significant but is also economically meaningful. A percentage point increase in gross capital inflows causes the real exchange rate to appreciate by approximately 3.9%. A substantial surge in capital inflows is associated with strong real exchange rate appreciation, which could jeopardise the competitiveness of export industries.

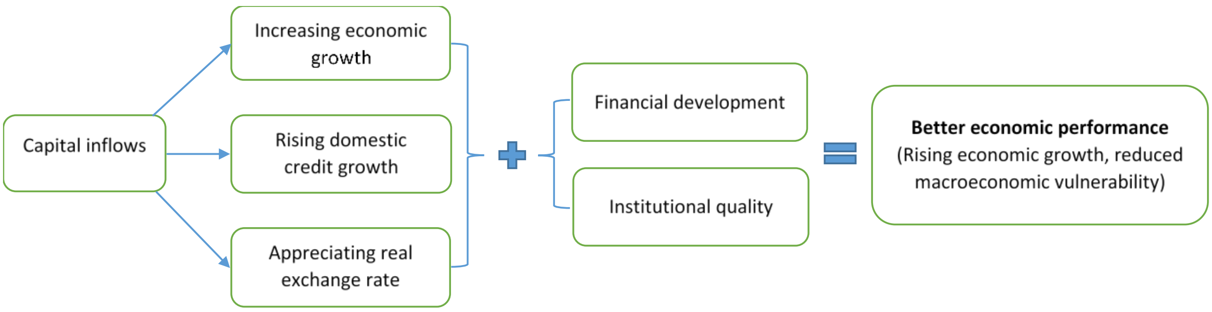
Third, the composition of capital inflows is essential in understanding the impact of capital inflows on the real exchange rate. The results indicate that FDI inflows generate real exchange rate appreciation, whereas the other types of capital inflows do not. This is broadly in line with the theoretical argument that an influx of foreign capital would increase the demand for non-tradable goods and services as well as the demand for labour in the tradable sector that needs to be absorbed from the non-tradable sector under the full-employment condition, thereby creating pressure on the prices of non-tradable goods and services (De Janvry & Sadoulet, 2016; Obstfeld & Rogoff, 1996). As a result, the real exchange rate appreciates.

Fourth, another important finding is that the impact of capital inflows or FDI inflows on real exchange rate appreciation could be attenuated by financial sector development. It is generally recognised that a well-developed financial sector mirrors efficient intermediation of financial resources across economic sectors and time (Levine, 1997). A well-performing financial industry in the capital-recipient economy can efficiently intermediate the inflows of foreign capital and thereby reduce the pressures on the real exchange rate.

7.3.4 Overall summary of the findings

Figure 7.1 illustrates an overall summary of the research findings. Though capital inflows are positively associated with economic growth, they also generate domestic credit growth and real exchange rate appreciation, which could quickly build up the macroeconomic vulnerability. Financial development plays a crucial role not only in promoting economic growth and reducing the pace of domestic credit growth but also in lessening the real exchange rate appreciation impact caused by capital inflows. Improved institutional quality further enlarges the positive impact of capital inflows on economic growth. It is also helpful in slowing down the speed of domestic credit growth driven by capital inflows. As a result, a country with better absorptive capacity, including greater financial development and higher institutional quality can attain more gains from capital inflows than a country with lower absorptive capacity.

Figure 7.1 An overall summary of the research findings in this study



Source: Author's illustration.

The study's findings challenge the assumption that if each country keeps its own house in order, the economy should work well. That is not necessarily the case because no country is fully insulated from such external forces as capital inflows. Although capital inflows generate growth-enhancing effects, they also carry risks that can aggravate macroeconomic vulnerability. In this respect, capital inflows can be a blissful bonanza or a devastating curse for the host economy. The challenges thus lie in how capital inflows are managed in the host economy to achieve net positive benefits from the inflows. The next section discusses some policy implications drawn from the study's findings that are valuable for managing capital flows.

7.4 Policy Implications

There are a few relevant policy implications that can be drawn from the study's findings. First, it is in the fundamental interests of EMDEs to devise policy and strategy to attract more foreign investments, especially FDI, to promote economic growth and thereby improve the living standards of their citizens. The first significant finding of this study indicates that capital inflows generate a positive impact on economic growth. FDI contributes significantly to economic growth after controlling for the different types of capital inflows. As generally recognised in the literature (Borensztein et al., 1998; Borja, 2017; Delgado et al., 2014), FDI inflows help drive economic growth in the capital-recipient economy by increasing investment, productivity, managerial expertise and technology transfer.

Second, it is essential for EMDEs to take an active approach to capital flow management. The study found that capital inflows cause expansion of domestic credit growth; the finding is robust for both aggregated and disaggregated levels of capital inflows. Indisputably, a certain pace of domestic credit growth is healthy and beneficial to support economic growth. However, domestic credit growth can expand rapidly because of the influx of foreign capital since domestic credit growth is persistent, as found in this study. It is worthwhile noting that too rapid a rise in credit growth may bring the economy to the brink of overshooting and instability. This study adds further empirical evidence that capital inflows, whether aggregated or disaggregated, generate real exchange rate appreciation. Based on the results, the real exchange rate is dynamic or highly persistent; a surge in capital inflows over consecutive periods may lead to a strong real exchange rate appreciation, which would undermine the export competitiveness and cause macroeconomic instability. In particular, at the disaggregated levels of capital inflows, although FDI contributes positively to economic growth, it can also cause swift domestic credit growth and real exchange rate appreciation. Some forms of FDI, for instance, may be channelled into the banking or financial sector, resulting in speedy credit supply and real exchange rate appreciation. Moreover, FDI has become increasingly changeable because of the spillover impacts from financial market volatility (IMF, 2011; Ocampo, 2017). Hence, it is imperative to closely monitor capital flow movements so that appropriate timely measures of capital flow management can be taken to mitigate the negative impacts.

Third, and related to the second implication above, another policy inference is that failure to recognise and resolve the buildup of financial and economic vulnerabilities can lead to financial or economic crises. Capital inflows carry the risk of generating rapid domestic credit growth; the growing credit may be channelled into risky sectors such as real estate and construction. Moreover, the risk would accrue quickly when the quality of credit deteriorates. The problem would be exacerbated if there is an external shock to the balance of payments. One principal finding of this study is that capital inflows also cause real exchange rate appreciation, which would result in a decrease in exports and thereby a negative effect on the balance of payments. This chain of risk accumulation can thus result in a full-blown economic crisis. To prevent this vulnerability buildup, risk management measures for capital flows need to be adopted together with active capital flow management.

With regard to policy measures to cope with the adverse effects of capital inflows such as domestic credit growth acceleration and real exchange rate appreciation, macroprudential policy tools and policy space creation are of paramount importance. For instance, the reserve requirement for banks is a vital policy tool for financial or monetary authorities of EMDEs in building a cushion against an influx of foreign capital. The increased reserve requirement may help reduce the speed of domestic credit growth. Similarly, creating policy space, such as foreign reserve accumulation and fiscal balance enhancement, plays a vital role. With adequate policy space, the capital-recipient EMDE governments can intervene in the foreign exchange markets to help stem appreciation pressures on the exchange rate caused by foreign capital inflows as long as the intervention is appropriate under the IMF rules (Ghosh, Ostry, & Qureshi, 2017). It is, however, worth noting that any policy intervention must be exercised with care because intervention in the foreign exchange or money markets amid an influx of capital may provoke more panic rather than calming down the market, leading to more adverse negative impacts. Some contingent clauses need to be exercised. Individual country conditions, for example, play a fundamental role in developing a more specific policy mix to manage capital inflows. In summary, macroprudential policy instruments are useful and available for policymakers in EMDEs to deal with the adverse effects of capital inflows. Generally, creating policy space is of utmost importance in strengthening the resilience of EMDEs against the adverse impacts of capital inflows.

Fourth, financial sector development should be a policy priority for policymakers in EMDEs to use capital inflows as effectively as possible. Challenges, such as domestic credit growth acceleration and real exchange rate appreciation, posed by the influx of capital could be complicated by the structural vulnerability of EMDEs. In this sense, the capital inflows can cause a quick buildup of risks in the financial sector threatening financial or macroeconomic stability. A notable finding of this study is that financial sector development plays a crucial role in promoting economic growth, slowing down the pace of domestic credit growth, and reducing the real exchange rate appreciation impact of capital inflows. Development of the financial sector can help bolster the strength and resilience of the economy in coping with capital inflows. In other words, financial sector development would support EMDEs in harnessing the bonanza of capital inflows. A pertinent question is: “How do EMDEs develop a well-functioning financial sector that can absorb as much benefits as possible from capital inflows to support a sustainable and resilient economic development?” The answer to this fundamental question is to develop an inclusive, robust and wider financial sector in EMDEs. In fact, the financial system of most EMDEs is currently dominated by banks. It is essential to add more financial products and services to the system to cater for different needs, to expand the coverage, and to increase the depth to promote inclusive financial access. As found in this study, increased portfolio equity inflows reduces the pace of domestic credit growth, thereby abating the risk of macroeconomic overshooting. Some of EMDEs that do not currently have a stock market may consider establishing one to enhance the financial system.

Fifth, institutional development should also be another policy priority for EMDEs to harness the benefits of capital inflows effectively. An essential finding of this study is that institutional quality plays a critical role not only in broadening the growth-enhancing impact of capital inflows but also weakening the domestic credit growth-inducing effects of capital inflows. Wei (2018) suggested that weak public governance in the host economy is one of the distortions that prevents the host economy from reaping the benefits of capital inflows. As argued by Engel and Park (2018), for many developing countries, a cause of being unable to benefit from international capital markets is their institutional failures that cannot assure international debt holders not to siphon off the foreign debts by devaluing their domestic currencies. In the meantime, low institutional quality also distorts the domestic financial market, which means the capital-recipient economy fails to gain the benefits of capital inflows because the distortions could wear down the returns on foreign capital (Wei, 2018). Distortion could be because of the expropriation from international investors by domestic corporate insiders and government bureaucrats for their private benefit (Wei, 2018). Institutional development (e.g., combating corruption, improving public governance) will help reduce uncertainty and encourage flourishing economic activity in the capital-recipient economy. Therefore, building and strengthening institutions are indispensable for EMDEs if these countries wish to maximise the benefits of capital inflows.

Finally, in today’s hyper interconnectedness, capital flows are practically inevitable. Rather than discussing whether to open or close the doors to capital flows, the debate should focus on how to manage the capital flows to not only maximise the benefits but also minimise the risks associated with capital flows. This study makes an important contribution to the evolving debate on the merits or demerits of capital flows. This study helps elevate the debate to a new level on how capital flows are managed for the capital-recipient economy to attain as much net positive benefits as possible.

7.5 Research Limitations

Although this study is a reasonably comprehensive analysis of the impacts of capital inflows on economic growth, domestic credit growth, and real exchange rate in EMDEs, it has a few limitations.

First, since most of the sample countries are low-income DEs and FDI is the leading contributor to gross capital inflows, the impact of the other forms of capital inflows on economic growth, domestic credit growth, and the real exchange rate could be overshadowed by the FDI inflows. Thus, some caution should be exercised in interpreting the results. For example, portfolio equity and debt inflows could be beneficial for boosting economic growth, but this link cannot be detected in an economy where a vibrant financial market is absent. This is the case in this study because some countries do not have significant amounts of portfolio investment inflows because of the under-developed financial markets. However, with a large sample of over 100 economies, this study improves the generalisation of the empirical results that capital inflows have a positive impact on economic growth.

The second limitation of this study is perhaps the measures of the key variables, including financial development and institutional quality. As this study uses the credit provision by banks as a percentage of GDP as a proxy of financial development, it is clear that this measure can cover the depth of and access to finance in the banking system. However, it is unable to reflect the overall development of the financial system that has both a banking system and financial markets. Moreover, even though the adopted measure of financial development can somewhat reflect the quality, it is geared more quantitatively. However, because this study focuses on EMDEs where banks dominate the financial system, credit provision by banks as a share of GDP is the most suitable measure of financial development.

Similarly, this study uses the corruption control index to approximate the institutional quality variable used in the analyses. This measure is undoubtedly imperfect because it cannot cover other aspects of institutional quality such as public service delivery and the legal and regulatory environment. Nevertheless, it reflects, to a great extent, how a country's public governance performs. The most worrying institutional issue in developing countries is corruption, which is generally recognised as a bottleneck to better economic performance.

7.6 Suggestions for Future Research

On the impact of capital inflows, there are a few possible avenues for further research. One avenue that needs more empirical evidence is how capital inflows affect economic growth. Specifically, what are the channels through which capital inflows can positively affect economic growth? Theoretically, capital inflows are anticipated to foster economic growth through increased investment, enhanced productivity, technology transfer, and/or lower financing costs. Hence, more information on the channels by which capital inflows support economic growth would be helpful to policymakers in designing more targeted policy to attract and manage capital flows.

Although the findings of this study can be largely generalisable, it is difficult to draw specific policy recommendations for any particular country. There are country-specific factors, including the performance of the monetary authority in the capital-recipient economy, that may have a role to play in analysing the impacts of capital inflows even though this study's cross-country analysis can, in no small extent, control for country heterogeneity. More importantly, understanding the nuanced conditions of the individual country is essential in drawing country-specific policy advice to manage capital flows. Hence, country-focused research would be useful for specific policy recommendations.

On the topic of the capital inflows-domestic credit growth nexus, this study controlled for the demand-side determinants of domestic credit growth by including the GDP growth rate. However, there could be other demand-side factors, such as investment opportunities in the host economy, that can mediate the link between capital inflows and domestic credit growth. Thus, future research may try to explore further whether other demand-side factors have a role in the capital inflows-domestic credit growth nexus. Moreover, it would be interesting to compare whether domestic credit growth is driven more by supply-side or demand-side factors.

Appendix A

List of Sample Countries

Table A.1 List of sample countries

no	country	region	no	country	region	no	country	region
1	Armenia	CIS	23	Mongolia	EDA	45	Turkey*	EDE
2	Azerbaijan	CIS	24	Myanmar	EDA	46	Antigua and Barbuda	LAC
3	Belarus	CIS	25	Nepal	EDA	47	Argentina*	LAC
4	Georgia	CIS	26	Papua New Guinea	EDA	48	Bahamas, The	LAC
5	Kazakhstan*	CIS	27	Philippines*	EDA	49	Barbados	LAC
6	Kyrgyz Republic	CIS	28	Samoa	EDA	50	Belize	LAC
7	Moldova	CIS	29	Solomon Islands	EDA	51	Bolivia	LAC
8	Russia*	CIS	30	Sri Lanka	EDA	52	Brazil*	LAC
9	Tajikistan	CIS	31	Thailand*	EDA	53	Chile*	LAC
10	Ukraine*	CIS	32	Tonga	EDA	54	Colombia*	LAC
11	Bangladesh	EDA	33	Tuvalu	EDA	55	Costa Rica	LAC
12	Bhutan	EDA	34	Vanuatu	EDA	56	Dominica	LAC
13	Brunei Darussalam	EDA	35	Vietnam	EDA	57	Dominican Republic	LAC
14	Cambodia	EDA	36	Albania	EDE	58	Ecuador	LAC
15	China*	EDA	37	Bosnia and Herzegovina	EDE	59	El Salvador	LAC
16	Fiji	EDA	38	Bulgaria	EDE	60	Grenada	LAC
17	India*	EDA	39	Croatia*	EDE	61	Guatemala	LAC
18	Indonesia*	EDA	40	Hungary*	EDE	62	Guyana	LAC
19	Kiribati	EDA	41	Macedonia, FYR	EDE	63	Haiti	LAC
20	Lao PDR	EDA	42	Poland*	EDE	64	Honduras	LAC
21	Malaysia*	EDA	43	Romania*	EDE	65	Jamaica	LAC
22	Maldives	EDA	44	Serbia	EDE	66	Mexico*	LAC

*Note: * indicates 31 emerging market economies (EME) and the rest of the countries are low-income developing economies (DEs).*

no	country	region	no	country	region	no	country	region
67	Nicaragua	LAC	89	Qatar*	MENAAP	111	Lesotho	SSA
68	Panama	LAC	90	Saudi Arabia*	MENAAP	112	Madagascar	SSA
69	Paraguay	LAC	91	Sudan	MENAAP	113	Malawi	SSA
70	Peru*	LAC	92	Syria	MENAAP	114	Mali	SSA
71	St. Kitts and Nevis	LAC	93	Tunisia	MENAAP	115	Mauritius	SSA
72	St. Lucia	LAC	94	Yemen	MENAAP	116	Mozambique	SSA
73	St. Vincent and the Grenadines	LAC	95	Angola	SSA	117	Namibia	SSA
74	Suriname	LAC	96	Benin	SSA	118	Niger	SSA
75	Trinidad and Tobago	LAC	97	Botswana	SSA	119	Nigeria	SSA
76	Uruguay*	LAC	98	Burundi	SSA	120	São Tomé and Príncipe	SSA
77	Venezuela*	LAC	99	Cameroon	SSA	121	Senegal	SSA
78	Bahrain	MENAAP	100	Cape Verde	SSA	122	Seychelles	SSA
79	Djibouti	MENAAP	101	Comoros	SSA	123	Sierra Leone	SSA
80	Egypt*	MENAAP	102	Democratic Republic of Congo	SSA	124	South Africa*	SSA
81	Jordan*	MENAAP	103	Republic of Congo	SSA	125	Swaziland	SSA
82	Kuwait*	MENAAP	104	Côte d'Ivoire	SSA	126	Tanzania	SSA
83	Lebanon	MENAAP	105	Ethiopia	SSA	127	Togo	SSA
84	Libya	MENAAP	106	Gambia, The	SSA	128	Uganda	SSA
85	Mauritania	MENAAP	107	Ghana	SSA	129	Zambia	SSA
86	Morocco*	MENAAP	108	Guinea	SSA	130	Zimbabwe	SSA
87	Oman*	MENAAP	109	Guinea-Bissau	SSA			
88	Pakistan*	MENAAP	110	Kenya	SSA			

*Note: * indicates 31 emerging market economies (EME) and the rest of the countries are low-income developing economies (DEs).*

Appendix B

Definitions of the Variables

Table B.1 Definitions of the variables used in the CIF-EG model

Variable	Definition	Unit	Source
Capital flow variables: Independent variable (IV)			
GCI	Sum of all types of financial flows (i.e. FDI, portfolio inflows, and other investment) in nominal values as a percentage of gross domestic products (GDP) at the current price.	%	IMF BOP
FDI	Total foreign direct investments from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
NONFDI	Sum of portfolio investment and other investment inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFL	Total portfolio inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFE	Portfolio equity inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFD	Portfolio debt inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
OI	Other investment inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
GDP growth rate: Dependent variable (DV)			
GDPG	Difference in the natural logarithm of real GDP per capita.	%	UNCTAD
Control variables			
GDPPC_INT	Natural logarithm of the real GDP per capita at the beginning period of each 5-year period.	Log	UNCTAD
GFCF	Gross capital formation as a percentage of GDP.	%	WDI
SE	Gross enrolment rate of secondary education.	%	WDI
POP	Natural logarithm of the total population of an economy.	Log	WDI
FD	Domestic credit issued to the private sector by banks as a percentage of GDP.	%	WDI
IQ	Control of corruption index obtained from World Governance Index with values ranging from -2.5 (poor performance) to 2.5 (strong performance).		WGI
FO	Chinn-Ito financial openness index with values ranging from -1.90 (most restrictive) to 2.37 (least restrictive). The higher the index value, the more open the financial account is.		Chinn and Ito
TO	Trade openness is the sum of exports and imports divided by GDP at the current price.	%	WDI
IFR	Inflation rate extracted from the IMF's WEO database April 2017 measured in annual average percent.	%	WEO
GC	Natural logarithm of government expenditure as a percentage of GDP.	Log	WEO
TE	Gross enrolment rate of tertiary education.	%	WDI

Table B.2 Definitions of the variables used in the CIF-DCG model

Variable	Definition	Unit	Source
Capital flow variables: Independent variable (IV)			
GCI	Sum of all types of financial flows (i.e. FDI, portfolio inflows, and other investment) in nominal values as a percentage of gross domestic products (GDP) at the current price.	%	IMF BOP
FDI	Total foreign direct investments from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
NONFDI	Sum of portfolio investment and other investment inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFL	Total portfolio inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFE	Portfolio equity inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFD	Portfolio debt inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
OI	Other investment inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
Domestic credit growth: Dependent variable (DV)			
DCG	Log difference of the real values of domestic credit to the private sector as a percentage of real GDP. The credit to the private sector is deflated by the consumer price index (CPI).	%	WDI
Control variables			
FD	Domestic credit issued to the private sector by banks as a percentage of GDP.	%	WDI
BM	Broad money as a percentage of GDP.	%	WDI
TO	Trade openness is the sum of exports and imports divided by GDP at the current price.	%	WDI
ERR	Coarse index ranges from 1 to 6. The higher the index, the more flexible the exchange rate regime is.		IRR
GDPPC_INT	Natural logarithm of the real GDP per capita at the beginning period of each 5-year period.	Log	UNCTAD
GDPG	Difference in the natural logarithm of real GDP per capita.	%	UNCTAD
IFR	Inflation rate extracted from the IMF's WEO database April 2017 measured in annual average percent.	%	WEO
CNER	Annual rate of change in the nominal exchange rate.	%	WDI
CPI	Consumer price index with 2010 price as the base year.		WDI
FO	Chinn-Ito financial openness index with values ranging from -1.90 (most restrictive) to 2.37 (least restrictive). The higher the index value, the more open the financial account is.		Chinn and Ito
GC	Natural logarithm of government expenditure as a percentage of GDP.	Log	WEO
GSG	Gross saving as a percentage of GDP.	%	WDI
DIR	Deposit interest rate.	%	IFS
LIR	Lending interest rate.	%	IFS

Table B.3 Definitions of the variables used in the CIF-RER model

Variable	Definition	Unit	Source
Capital flow variables: Independent variable (IV)			
GCI	Sum of all types of financial flows (i.e. FDI, portfolio inflows, and other investment) in nominal values as a percentage of gross domestic products (GDP) at the current price.	%	IMF BOP
FDI	Total foreign direct investments from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
NONFDI	Sum of portfolio investment and other investment inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFL	Total portfolio inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFE	Portfolio equity inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
PFD	Portfolio debt inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
OI	Other investment inflows from abroad in nominal values as a percentage of GDP at the current price.	%	IMF BOP
Real exchange rate: Dependent variable (DV)			
REER	Natural logarithm of the real effective exchange rate index with the year 2007 as the base year (2007=100).	Log	Bruegel
Control variables			
TO	Trade openness is the sum of exports and imports divided by GDP at the current price.	Log	WDI
TOT	Terms of trade are the ratio of export to import values with the year 2000 as the base year (2000=100).	Log	WEO
GDPPC	Natural logarithm of the real GDP per capita at a constant price.	Log	UNCTAD
GC	Natural logarithm of government expenditure as a percentage of GDP.	Log	WEO
FO	Chinn-Ito financial openness index with values ranging from -1.90 (most restrictive) to 2.37 (least restrictive). The higher the index value, the more open the financial account is.		Chinn and Ito
FD	Domestic credit issued to the private sector by banks as a percentage of GDP.	Log	WDI
ERR	Coarse index ranges from 1 to 6. The higher the index, the more flexible the exchange rate regime.		IRR
EMS	Growth rates of money supply minus GDP growth rates.	%	WDI
CNER	Annual rate of change in the nominal exchange rate.	%	WDI
GGD	General government gross debt as a percentage of GDP.	%	WEO
TRG	Total reserve minus gold as a percentage of GDP.	%	WDI
IFR	Inflation rate extracted from the IMF's WEO database April 2017 measured in annual average percent.	%	WEO
NODA	Natural logarithm of net official development assistance received as a percentage of GDP.	Log	WDI

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